

ALAMEDA COUNTY CONGESTION MANAGEMENT AGENCY

1333 BROADWAY, SUITE 220 ◆ OAKLAND, CA 94612 ◆ PHONE: (510) 836-2560 ◆ FAX: (510) 836-2185 E-MAIL: mail@accma.ca.gov ◆ WEB SITE: accma.ca.gov

TRI-VALLEY TRIANGLE STUDY POLICY ADVISORY COMMITTEE

Friday, June 9, 2006 3:00 PM

Regional Room City of Dublin 100 Civic Plaza Dublin, CA 94568 Members:

Mayor Janet Lockhart City of Dublin Councilmember Kasie Hildenbrand City of Dublin Mayor Marshall Kamena City of Livermore Councilmember Marjorie Leider City of Livermore Mayor Jennifer Hosterman City of Pleasanton Councilmember Cindy McGovern City of Pleasanton Supervisor Scott Haggerty Alameda County Supervisor Nate Miley Alameda County

AGENDA

1.0 INTRODUCTIONS

2.0 PUBLIC COMMENT

Members of the public may address the Committee during "Public Comment" on any item <u>not</u> on the agenda. Public comment on an agenda item will be heard when that item is before the Committee. Anyone wishing to comment should make their desire known to the Chair.

3.0 MINUTES OF TAC MEETINGS

INFORMATION

The minutes of the 3/13/06, 4/11/06, and 5/3/06 TAC meetings are attached for your information.

4.0 MINUTES OF MARCH 24, 2006 MEETING

ACTION

The Committee is requested to review and approve the Minutes for the March 24, 2006 PAC meeting.

5.0 TRI-VALLEY STUDY PRESENTATION

INFORMATION/ACTION

The consultant team will present preliminary quantitative results of the Year 2030 Base Case, and Alternatives 1 through 6 model runs will be presented in the following order: Alternatives 1, 5, 4, 6, 3, 2A and 2B. This order seems logical based on the components of each of the alternatives. A discussion of the qualitative MOEs will follow the presentation of the quantitative results. The Committee is requested to provide input on the results of the qualitative analysis for each of the alternatives.

6.0 SCHEDULE ACTION

An updated project schedule is attached for your information and approval.

7.0 OTHER BUSINESS

8.0 ADJOURNMENT/NEXT MEETING

FRIDAY, JUNE 30, 2006

The next meeting will be a combined PAC and TAC workshop to develop a hybrid alternative for testing.

TRIANGLE TRAFFIC STUDY PAC Meeting Packet June 9, 2006

 $Agenda\ Item\ 3-TAC\ Meeting\ Minutes$

PARSONS

100 Park Center Plaza, Suite 450 • San Jose, California 95113 (408) 280-6600 • Fax (408) 280-7533

Date: March 13, 2006 645176/224.01

Project: Tri-Valley Triangle Study

Subject: Triangle Technical Advisory Committee Meeting Minutes

To: All who attended meeting, see attached sign-in sheet

From: Gui Shearin Parsons

Enclosed are the minutes for the Triangle TAC meeting held on March 13, 2006. If you have any questions, comments, or changes to the minutes, please contact Jean Hart. The next TAC meeting is scheduled for April 11, 2006 at 9:30 AM at the Dublin City Hall.

In finalizing the minutes, a correction was made per email from Obaid Khan to address his Page 2 comment that the minutes missed the discussion on and the County's request to include the travel time comparisons between the HOV lane travel and mixed flow lanes travel.



645176/224 01

PROJECT: Tri-Valley Triangle Study

SUBJECT: Triangle TAC Meeting

DATE: March 13, 2006; 1:00 PM

LOCATION: Dublin City Hall

100 Civic Plaza Dublin, CA 94568

ATTENDEES: See attached sign-in sheet, Agenda, and attachments

MINUTES BY: Parsons

The meeting consisted of a presentation on the results of modeling Alternatives Future Base, 1, and 6; a review of qualitative measures; presentation of estimated capital costs; and developing an agenda for the next PAC meeting.

The following is a summary of the meeting. Action items are shown in **bold** and critical path items are in **bold and italicized**. Action items subsequently completed are in *italics*.

| DISCUSSION | ACTION |
|--|--------------------------------------|
| Welcome and Introductions: Kai Chan of Parsons opened the meeting and everyone introduced themselves to the group. Representatives of all three Tri-Valley cities, Caltrans, and Alameda County were present, although Bob Vinn of Livermore arrived after the minutes were approved. | |
| Review and Approval of Minutes of January 12, January 20 and February 8, 2006: The minutes of the three meetings were approved with the following changes: | |
| Obaid Khan of Alameda County had sent in an e-mail correction regarding the February 8 meeting minutes. | |
| Ray Kuzbari of Dublin said that in the 1-20-06 TAC meeting, he was recommending review of existing truck data, not collection of additional data. | |
| Results of Modeling for Alternatives 1 and 6: Gui Shearin of Parsons presented the results of the revised modeling for Alternatives Future Base, 1, and 6. The information consisted of a revised memorandum on Summary of Model Results (dated 3-13-06), queuing graphics, and travel demand difference plots. The revised memorandum was passed out at the meeting; the differences compared with the memorandum in the advance packet were improvements in state route VMT calculations and average trip time options for TAC discussion. The conclusions of the memorandum remained unchanged. | |
| Questions and comments from the TAC on the queuing results and difference plots included the following: | Parsons to review Alt 6 AM westbound |

Triangle Traffic Study – TAC Meeting Minutes – March 13, 2006

• Ray Kuzbari questioned the validity of the diversion to Dublin Boulevard from westbound I-580 in the Alternative 6 AM case. Gui Shearin said that the diversions were the result of the westbound bottleneck approaching Santa Rita. Ravi Puttagunta noted that the bottleneck and queuing was aggravated by the high number of trucks restricted to the right lanes and this limited the ability of drivers to get on and off of the freeway. Ray requested the consultant team to take a closer look at the results.

diversion to Dublin Boulevard and the Alt. 1 and 6 PM diversions from Central Parkway.

 Ray Kuzbari also questioned the diversion from Central Parkway in Alternatives 1 and 6 PM eastbound conditions, particularly the back and forth nature of the effect under Alternative 6. Gui Shearin said that he thought that this might be simply noise in the assignments given that the numbers shown on the difference plot were less than 50 vehicles. There was some discussion of whether a threshold of greater than 50 or 100 vph would eliminate this effect if it were simply noise in the model.

Parsons to review the Altamont Pass diversions under Alt 1 AM and Alt 6 PM.

 Obaid Khan of Alameda County said that there were also puzzling diversions between I-580 and the Altamont Pass Road in the Alternative 1 AM condition and the Alternative 6 PM condition. Parsons to review the lack of a PM bottleneck eastbound at Isabel under Alts 1 and 6 as well as the new AM bottleneck on westbound I-580 approaching Santa Rita under Alternative 6.

• David Seriani of Caltrans asked why there was no bottleneck at Isabel Avenue eastbound in the PM peak under Alternatives 1 and 6 when there was one under the Future Base. He also said that the westbound AM bottleneck approaching Santa Rita under Alternative 6 does not make sense because there were no geometric changes in the westbound direction compared with the Future Base. Ravi Puttagunta of Parsons said that these queuing differences were the result of relatively small changes in the travel demand and served volumes that had a disproportional effect because I-580 would be at capacity and operating at an unstable level of service in many locations as well as would have high truck percentages that restricted flow in the two right-hand lanes.

Parsons to provide Cube file plot and explanation for Alt 6 eastbound PM.

 Bob Vinn of Livermore asked about the meaning of both increases and decreases in the difference plot for Alternative 1 eastbound PM between El Charro and Airway. He would like the Cube file to better see which volume applies to which link.

Gui Shearin presented three ways of calculating average trip time in the measures of effectiveness and asked the TAC which approach was more desirable. The three methods were as follows:

- Overall average trip time (i.e., for all trips in model) from combined travel demand and CORSIM statistics; this was the statistic included in the MOE table of the memorandum.
- Overall average trip time (i.e., for all trips in model) from the travel demand model only; and
- Selected point-to-point average trip times corresponding to origin/destination (o/d) pairs. The two o/d paths illustrated in the meeting were the peak-direction travel times between Andrade and North Flynn for the freeway route only and for the freeway plus Route 84 route.

Parsons to use o/d method for computing average trip time MOE and to include segments best representing times to city downtowns, contrasting mixed-flow and HOV times.

In discussion of these approaches, the TAC preferred showing the times for

Triangle Traffic Study – TAC Meeting Minutes – March 13, 2006

the o/d pairs. Bob Vinn of Livermore asked if some segments could also be shown that would give times to the city downtowns. Because CORSIM does not model the local streets, the segments might be limited to the times to closest freeway interchange or Route 84 intersection to a given downtown. Gui Shearin said that the times for multiple o/d pairs would have to be averaged in some way to allow them to be scored as a single time saving measure per alternative. Obaid Khan asked that the travel time comparison show the difference in the HOV and mixed-flow lanes. (Note: At the March 24, 2006 PAC Meeting, the PAC changed this direction to show state route travel time savings multiplied by the number of vehicles, which is simply VHT on the state routes from CORSIM.)

Qualitative Measures: Kai Chan of Parsons presented an update of the qualitative measures memorandum based on TAC comments received to date. The TAC requested that the methodology be changed to include queuing location questions that focused on the presence of queues in the jurisdictions of the cities of Dublin, Pleasanton, and Livermore, and within Alameda County. There was some discussion of whether rating the gueues by their proximity to cities was better than rating them overall, with mixed opinions offered. Rob Wilson of Pleasanton said that the overall perspective was better, with the key question being whether the queues were away from critical areas or not. The compromise method of one question for the overall count of queues and four questions aimed at the effects on the individual jurisdictions appeared to be acceptable to the group. Ray Kuzbari asked what would happen if a queue overlapped two cities. Kai Chan said that we would split the effect, which was acceptable to Ray Kuzbari and Rob Wilson. Obaid Kahn asked how we would handle a bottleneck that moves from jurisdiction to another? Would it be better to look at the length of the gueue. or look at the number of bottlenecks? David Seriani said that we would need to look at the "intensity" of the queue. Speed of the queue was important to consider in the rating, and that stop-and-go would be the worst in comparison to a queue that kept moving, albeit more slowly than free-flow speeds. Ravi Puttagunta said that was being taken into account.

Bob Vinn asked if the AM Alternative 6 westbound queue is worse than the Future Base westbound queue. Gui Shearin said that VHD and relevant trip time were about 1% worse for Alternative 6, but Ravi Puttagunta said that the Future Base queue extended east of the simulation area, so we do not know how long the Future Base queue would really be and no precise comparison could be made.

For the project readiness qualitative criterion, there was a suggestion that the project sponsor for each project help to assemble data to be presented to the TAC and each city would get to vote on the rating of the information. Bob Vinn asked what the goal of the project readiness criterion was, i.e., that the schedule would make sense for each project should be taken into account. For the qualitative rating of funding, Bob Vinn suggested that it should account for what funding is committed to a project plus what could be allocated by moving funding around in the total funding pot. Jean Hart of the CMA said that process was important here, that RTP updates would be needed to clarify what funding was agreed upon for each project.

Rob Wilson said that the consultant should do the sample scoring and details and let the TAC vote on it. It was agreed that the high and low ratings would be discarded. It was suggested that relevant points, such as the presence of

Parsons to develop draft "project readiness" considerations and send to the TAC members by e-mail for comment.

Triangle Traffic Study – TAC Meeting Minutes – March 13, 2006

| obstacles to the project (included in the readiness criterion), should be left open for the PAC to give input as part of their review and acceptance of the overall scoring results. | |
|--|--|
| Agenda for March 24th Policy Advisory Committee Meeting: There was discussion of what to present at the upcoming PAC meeting. Generally the PAC would need a status report since the last PAC meeting was November 4. Rob Wilson suggested reminding them of the project and its purpose, what the alternatives are, and where we are in the process. Because the scoring methods have previously been presented to the PAC, a presentation of the overall methods with example data to be used could be given to make sure the PAC understands what they will be reviewing at a later meeting. The schedule should also be explained. The red/green difference plots might also be included if they could be restricted to showing only the most important diversions. The presentation needs to convey that work has been going on and explain the reasons why the work has taken longer than anticipated. | Parsons to provide the CMA with an agenda. |
| <u>Estimated Costs of Alternatives</u> : Kai Chan gave a brief overview of the estimated costs and asked for any feedback from the TAC via e-mail. The TAC iterated that the cost estimates should be by component and Kai noted that was how they had been prepared. | |
| Next Steps/Next Meeting – The next TAC meeting was planned for April 11, 2:30 p.m. Location: Dublin City Hall. This was subsequently changed to 9:30 a.m. | |
| The meeting will review the results of the on going travel demand modeling and simulation. | |



ALAMEDA COUNTY CONGESTION MANAGEMENT AGENCY

1333 BROADWAY, SUITE 220 • OAKLAND, CA 94612 • PHONE: (510) 836-2560 • FAX: (510) 836-2185 E-MAIL: mail@accma.ca.gov • WEB SITE: accma.ca.gov

TRI-VALLEY TRIANGLE STUDY TECHNICAL ADVISORY COMMITTEE ROSTER OF ATTENDANCE MARCH 13, 2006

REGIONAL MEETING ROOM, DUBLIN CITY OFFICES 100 CIVIC PLAZA, DUBLIN, CALIFORNIA

| | NAI | ME | JURISDICTION/ ORGANIZATION | PHONE # | E-MAIL | |
|-----|--------|------------|-------------------------------|-----------------|--------------------------------|-------------|
| 1_ | OBAI | KHAN | Alameda Coun | ty 510-670-5921 | OBAIDE ACTUA. ORG | |
| 2 | Low | Kuzbari | Dublin | 928-833-6634 | ray. Kuztari @ci.du& | in.ca.us |
| | - () | Wilson | PLEAVANTON | 925 931-5653 | nuilson @ci, plasenten. ca. us | |
| 4 | John | Mc Kepaie | CT. DSTRP | 570 286-515C | john-M-HENZEED do 1. car | .97 |
| 5 | PHIL | LIP COX | CT-FORECAST | 510-286-5584 | PC0x @ d0+, C0. | 904 |
| 6 | Stefa | an Garcia | AcemA | 510 836 2560 | sgaveia @acema.ca.gov | |
| 7 | Beh | Walnes | Cant (angulfan) | 510/8362560 X | 26 bwalukas@ accma. | ca.sov |
| 8 | Jean | 1 Hart | CITIA stable | • | | |
| 9 | Lois | Stevens | Parsons | 415.495-6060 | lois.stevens@parsons. | com |
| 10. | Ravi | Puttagunta | ()) | 408.28D.6600 | rabindra. Puttagunta@1 | Parsons lom |
| 11. | Kal | Cha | (* | 408-495-6060 | | Con |
| 12. | H. Day | ad Seria | ni Colfrans | 510-286-4653 | david seriani adot, Co | 900 |
| | Bol | . 11 | Livermore | 925 960 45/6 | | |
| 14. | | | | | <u> </u> | |
| 15. | | | | | | |
| 16. | | | | | | |
| 17. | | | | | | |
| 18_ | | | | | | |
| 19. | | | | | | |
| 20. | | | | | | |
| 21. | | | | | | |
| 22. | | | | | | |

PARSONS

100 Park Center Plaza, Suite 450 • San Jose, California 95113 (408) 280-6600 • Fax (408) 280-7533

June 9, 2006 PAC Meeting Agenda Item 3.2

Date: April 11, 2006 645176/224.01

Project: Tri-Valley Triangle Study

Subject: Triangle Technical Advisory Committee Meeting Minutes

To: All who attended meeting, see attached sign-in sheet

From: Gui Shearin Parsons

Enclosed are the minutes for the Triangle TAC meeting held on April 11, 2006. If you have any questions, comments, or changes to the minutes, please contact Jean Hart. The next TAC meeting is scheduled for May 3, 2006 at 1:00 PM at the Dublin City Hall.



645176/224.01

PROJECT: Tri-Valley Triangle Study

SUBJECT: Triangle TAC Meeting

DATE: April 11, 2006; 9:30 AM

LOCATION: Dublin City Hall

100 Civic Plaza Dublin, CA 94568

ATTENDEES: See attached sign-in sheet, Agenda, and attachments

MINUTES BY: Parsons

The meeting consisted of presentations on the results of modeling Alternatives Future Base, 1, 4, 5, and 6; a proposed outline of the report; and the benefit-cost methodology.

The following is a summary of the meeting. Action items are shown in **bold** and critical path items are in **bold and italicized**. Action items subsequently completed are in *italics*.

| DISCUSSION | ACTION |
|---|--------------------|
| Welcome and Introductions: Jean Hart of ACCMA opened the meeting and everyone introduced themselves to the group. Representatives of all three Tri-Valley cities, Caltrans, and Alameda County were present. | |
| Review and Approval of Minutes of March 13, 2006: The minutes of the March 13 meeting were approved with the change noted in Obaid Khan's email to reflect HOV and mixed-flow times in comparing travel times among the alternatives. | |
| Revised Results of Modeling for Alternatives 1 and 6: Lois Stevens of Parsons presented the results of the revised modeling for Alternatives Future Base, 1, and 6 with the changes in the AM Future Base to adjust for an additional 180 vph. The information consisted of a revised memorandum on Summary of Model Results (dated 4-4-06), queuing graphics, and travel demand difference plots. The AM slow down in traffic west of El Charro now appears in both the Future Base and Alternative 1. | |
| Questions and comments from the TAC on the queuing results and difference plots included the following: | |
| Obaid Khan asked why there was no queue eastbound at Isabel in the PM for Alternative 1. Ravi Puttagunta explained that there was a change in travel pattern and volumes because of Route 84 improvements. | |
| Bob Vinn asked about the speeds on the Altamont grade. Ravi said that they were about 30-35 mph, so the speeds did not reach the slowdown range of 15 to 30 mph. | Parsons to review |
| | raisolis lo review |

Triangle Traffic Study – TAC Meeting Minutes – April 11, 2006

- Obaid asked why there was not any diversion to the county roads in Alternative 1 when the queue on I-680 went back up to Sunol. Parsons will check with Dowling about this issue, and what the difference is with Alternative 5 which shows an increase in diversion.
- Bob Vinn said that the modeling of Alternative 6 did not reflect what
 was originally intended. (Note: Alternative 6 was modeled as directed
 by the TAC and PAC.) There was a discussion on this, with Jean
 Hart saying that this is a deficiency of Alternative 6 and should be
 considered in the development of a hybrid alternative.
- Parsons will ask Dowling about the cut through traffic in Alternative 6 on Stoneridge to determine if it is from the system interchange metering or from the congestion approaching Santa Rita.

Jeff Knowles asked if Alternative 6 could be rerun if Pleasanton paid for it. He thinks that without the added operational and cost information, it is difficult to adequately assess candidate components for a hybrid alternative. The order of magnitude cost for remodeling Alternative 6 is \$8,000 to \$10,000 if it similar to other alternatives; this figure is subject to verification by Parsons. Note that there would be additional capital costs to be estimated for the modification that are very expensive. Bob Vinn of Livermore suggested that it should be addressed as an additional hybrid alternative. Lois said that the effect on the schedule of running another version of Alternative 6 would be on the order of four to five weeks.

lack of diversion to county roads in Alternative 1 when the queue goes back to Sunol.

Parsons to review cut through traffic on Alternative 6 to see if this is result of lane drop or system ramp metering.

Parsons to determine costs for Pleasanton of rerunning Alternative 6 with additional link.

Alternative 4 Results: Lois presented the results of Alternative 4. She described the alternative as adding a fifth lane up the hill to North Flynn Road. The modeling does not determine if the eventual lane drop to four lanes will cause queuing or not because five lanes are carried to the limits of the study area.

- David Seriani asked for a check of a lane drop after the North Flynn Road interchange. This will be a "dummy" lane drop.
- Obaid Khan asked for a clarification of the HOV lane drop. Lois explained that the HOV lane would end between Vasco and Greenville Roads to allow the mixed-flow traffic to merge to the left and thereby allow trucks to merge east of Greenville Road. This change provides sufficient additional capacity to keep a bottleneck from forming because the HOV lane would not be operating at capacity at this location.
- Jeff asked how the state route VMT could go down in Alternative 4.
 Parsons will check and make sure that there is no error in the VMT summing in CORSIM. Bob Vinn suggested zeroing out the queue changes if they are not logical results. Ray Kuzbari of Dublin said that we should have all the results in front of the TAC first before deciding 1) whether to do this and 2) what the thresholds should be.

Parsons to check the effect of the merge from 5 to 4 lanes at N. Flynn.

Parsons to further check VMT and queuing changes under Alternative. 4.

Alternative 5 Results: Lois presented the preliminary results of Alternative 5, which did not include the measures of effectiveness. A more detailed packet of Alternative 5 results will be sent by email to the TAC. She explained that the difference in Alternative 1 and Alternative 5 is an added eastbound mixed-flow lane from Isabel to Vasco and an increase in the ramp metering rate at Isabel to 1,700 vph instead of 1,200.

• Obaid said that the southbound diversion on I-680 is what he

Parsons to check AM diversion in Alternative 5 versus Alternative 1 in difference plot.

Parsons to send

Triangle Traffic Study – TAC Meeting Minutes – April 11, 2006

| expected and had also anticipated on Alternative 1. (See earlied discussion. Parsons to check Alternative 1.) He also said that there was a similar issue on Livermore roads eastbound in the PM for Alternative 5. | show the off-peak |
|---|--|
| Jeff requested an investigation of the extraction of the MOEs of Alternative 4, using this alternative as an illustrative test case for the methodology. In addition he would like to see the more detailed file that report the CORSIM results. It was agreed that this information would be provided to the TAC and presented at the next TAC meeting. | complete Alternative 5 results to the TAC. |
| Obaid also said that the he wanted to see HOV travel time contrasted with mixed-flow time. | t l |
| <u>Summary Graphic of Queuing Graphics</u> : Lois presented the diagram Comments included the following: | investigate |
| .Add speeds to key. | providing a Route 84 queuing |
| Show northbound I-680 HOV lane as "modified" HOV lane. | diagram. |
| In response for a discussion of Route 84 data, Bob Vinn asked for speed and queuing diagram for Route 84 similar to those for the freeway. This is in the context of Ravi saying that there was no significant queuing in the future on Route 84. Route 84 was, however included only to check the capacity of the intersections. There was no calibration of Route 84 to existing conditions, which corresponded to this limited scope of work for Route 84. | e o c, |
| Report Outline and Reporting: In response to the report outline, the TAC: | |
| Suggested that a summary of methodology appear in the report along with more detail in the appendices. | |
| Concurred that the tabular format presented that shows the results be jurisdiction is acceptable. | ′ |
| Suggested that the benefit-cost index to show the annualized cost (both highest and median) per hour of annual time savings, and explain the conversion of peak-hour to daily and annual costs. | |
| Next Steps/Next Meeting – The next TAC meeting was suggested for May at 1:00 PM. Location: Dublin City Hall. | 3 |
| The meeting will review the results of the on going travel demand modeling and simulation. | |
| | |



ALAMEDA COUNTY CONGESTION MANAGEMENT AGENCY

1333 BROADWAY, SUITE 220 • OAKLAND, CA 94612 • PHONE: (510) 836-2560 • FAX: (510) 836-2185 E-MAIL: mail@accma.ca.gov • WEB SITE: accma.ca.gov

TRI-VALLEY TRIANGLE STUDY TECHNICAL ADVISORY COMMITTEE ROSTER OF ATTENDANCE APRIL 11, 2006 DUBLIN CITY OFFICES DUBLIN, CALIFORNIA

JURISDICTION/ PHONE # E-MAIL **ORGANIZATION** NAME 1 Michele Bellows ACTIA 5102676114 mbellows Qenvirotranssolutions. Com 2. OBAID KHAN Alameda Comty 510-670-5921 OBAID CACTELA. OKL KIM KLOEB SJCOG 209.4683913 RKLOEB & SJCOG, ORG JEFF KNOWLES PLEASANTON 925 9315677 JKNOWLESE CI. PLEASANTON C 925 833 6634 vay, Kutlari @ci. dublin. a. 6.H. Dand Seriani CJ- Hwy Ops 5/0-286-4653 dand Seriani & dot. (9, 90) john McKenzie OT-05RD No 286-5556 john McKenzie Bdot. as god CT-FORECASTIME STO-286-5584 PCOX @ COTICO, GOV Cox CMA STU Parsons 415.495.6060 lois stevens@parsons.com 13. 17. 18

PARSONS

100 Park Center Plaza, Suite 450 • San Jose, California 95113 (408) 280-6600 • Fax (408) 280-7533

June 9, 2006 PAC Meeting Agenda Item 3.3

Date: May 3, 2006 645176/224.01

Project: Tri-Valley Triangle Study

Subject: Triangle Technical Advisory Committee Meeting Minutes

To: All who attended meeting, see attached sign-in sheet

From: Gui Shearin Parsons

Enclosed are the minutes for the Triangle TAC meeting held on May 3, 2006. If you have any questions, comments, or changes to the minutes, please contact Jean Hart. The next TAC meeting is scheduled for May 18, 2006 at 1:00 PM at the Dublin City Hall.



645176/224.01

PROJECT: Tri-Valley Triangle Study

SUBJECT: Triangle TAC Meeting

DATE: May 3, 2006; 1:00 PM

LOCATION: Dublin City Hall

100 Civic Plaza Dublin, CA 94568

ATTENDEES: See attached sign-in sheet, Agenda, and attachments

MINUTES BY: Parsons

The meeting consisted of presentations on the responses to TAC questions from the April 11 TAC meeting and ongoing results of modeling Alternatives Future Base, 1, 3, 4, 5, and 6.

The following is a summary of the meeting. Action items are shown in **bold** and critical path items are in **bold and italicized**. Action items subsequently completed are in *italics*.

| DISCUSSION | ACTION |
|---|--|
| Welcome and Introductions: Jean Hart of ACCMA opened the meeting. Representatives of all three Tri-Valley cities and Caltrans were present, but there was no representative from Alameda County. | |
| Review and Approval of Minutes of April 11, 2006: The minutes of the April 11 meeting were approved with the deletion of the next to last sentence under "Revised Results of Modeling for Alternatives 1 and 6" per request of Jeff Knowles of Pleasanton. | |
| Follow-up to TAC Comments from April 11, 2006: Lois Stevens of Parsons presented the results of the revised Alternative 1 PM plot. It now looks like the plot for Alternative 5 as expected. Ravi Puttagunta of Parsons explained that the higher ramp metering rate on Route 84 contributes to this difference. | Parsons to send Jeff Knowles the Future Base |
| Lois confirmed that the diversion shown on the Alternative 6 difference plot is from vehicles avoiding the queues on through the system interchange between the Stoneridge off-ramp and the I-580. | spreadsheets summarizing the CORSIM results. |
| On the Alternative 4 methodology example, there was discussion on whether the VMT changes centering about unexpected congestion on westbound I-580 in the AM make sense. The conclusion was to suppress anomalous results like this in the future. Bob Vinn of Livermore said that it was not a result that could be explained to the PAC. It was agreed that after the analysis for all of the alternatives was complete, the Consultant Team would look at all of the results to determine if there is a model "noise" issue that needs to be addressed and report back to the TAC. | |
| Gui Shearin of Parsons explained the annotation of measures of effectiveness (MOEs): Jeff Knowles would like a tabulation of traffic external | |

Triangle Traffic Study – TAC Meeting Minutes – May 3, 2006

to Pleasanton (Pleasanton XX traffic) in the reporting. This question will be directed to Kym Sterner of Dowling to see if she can accommodate the request. Suggestions of presentation of the MOE results included adding "TransCAD/travel demand model" to the title of Table 2, which is derived totally from that model, and removing the Route 84 label from the queuing column since queues are not being tabulated on Route 84.

Lois Stevens gave a summary of the history and scope of the approach to Route 84. CORSIM analysis of Route 84 was not part of the initial consultant scope and budget, and Route 84 issues were to be addressed by the parallel ACTIA study. TAC concern about the timing of that study and its use of a different model led to requests for information on Route 84 intersections to be developed by Parsons, but funding was never identified for this effort. Although the CORSIM model reports delay and travel statistics for Route 84, it does not extract data on queuing nor is it calibrated to current Route 84 conditions.

Dave Seriani of Caltrans and Jeff Knowles commented that there is some queuing or slow down northbound on Route 84 in the PM after traffic exits I-680. The language of the summary memo needs be altered to reflect this.

Jeff Knowles was concerned about the model is not reflecting the northbound queue when the lanes drop from two to one and thereby is not reflecting the benefit of widening Route 84. David Seriani said that the assumed I-680 constraint at Alameda Creek would keep any substantial benefit from happening as a result of widening Route 84, i.e., the total demand served in the 680 corridor would not go up by that much because of the constraint. David agreed that there would be shift in traffic shifted from I-680 to Route 84. Bob Vinn would like a description of the queuing. Jeff and Bob would like to see the future base with queuing reflected at this location as well as the southbound merge following Pigeon Pass. Parsons will schedule a conference call with Jeff and David to agree on an approach, run it in the next week, and report back to the TAC by email.

Parsons to schedule conference call with Jeff Knowles and David Seriani to work out methodology for checking delay at Route 84/I-680 and report back to the TAC.

Results of Modeling: Lois presented the Alternative 5 results. David Seriani asked what is causing the delay at El Charro; it looks like a bottleneck to him. Ravi Puttagunta of Parsons explained that it was caused by the trucks in the right two lanes impeding on/off movements at the interchanges.

Ray Kuzbari of Dublin commented on the lack of a queue at I-680 westbound and attributed it to the queuing model not capturing the westbound interchange queuing in the existing conditions. Ravi disagreed, saying there were upstream changes with ramp metering that would change this, but Ray said that that the TAC had thought that the initial calibration was not as accurate as they would like.

Bob Vinn would like a comparison of Alternatives 1 and 5 in the report to say what the mixed flow lane does or does not do. In presentation of the queuing, speeds should be added to queuing key. Ray asked about "Vasco" in the title of the alternative MOE summary, which should refer to the lane ending at Isabel. Bob asked about difference in Alternative 1 and Alternative 5 queuing in the AM; Parsons is to check since the presentation did not include the Alternative 1 queuing diagram. (The queuing is very similar, but there was not time to display the comparison for the TAC). David Seriani said that in general Parsons should tell a story about all of these numbers; this explanation would be part of "noise" versus real results check.

Parsons to explain the effect of the additional mixed flow lane on Alternative 5 compared with Alternative 1 in report.

Parsons to add speeds to the queuing key.

Parsons was requested to check the diversion of traffic parallel to I-680 north of the system interchange

Triangle Traffic Study – TAC Meeting Minutes – May 3, 2006

| Lois gave the preliminary results of Alt 3 and 2A. With respect to the "L" shaped diversion pattern shown on the difference plots north of the I-580/ I-680 interchange, Parsons was requested to check with Dowling for an explanation. | |
|--|--|
| <u>Date for next TAC meeting</u> : June 18 at 1:00 PM. Location: Dublin City Hall. The meeting will review the results of the on going simulation. | |



ALAMEDA COUNTY CONGESTION MANAGEMENT AGENCY

1333 BROADWAY, SUITE 220 ● OAKLAND, CA 94612 ● PHONE: (510) 836-2560 ● FAX: (510) 836-2185 E-MAIL: mail@accma.ca.gov ● WEB SITE: accma.ca.gov

TRI-VALLEY TRIANGLE STUDY
TECHNICAL ADVISORY COMMITTEE
ROSTER OF ATTENDANCE
MAY 3, 2006
REGIONAL MEETING ROOM
DUBLIN CITY OFFICES
DUBLIN, CALIFORNIA

JURISDICTION/

| NAME | ORGANIZATION | PHONE # | E-MAIL | 1. | |
|----------------------|--------------|----------------|---------------|---------------------|----------|
| | Livermere | 925-960 4516 | bg Vinne | @ Ci.livermin | c .ca.us |
| 2. Stefan Garcia | CNIA | 510 836 2560 | sgareia o ac | ccma, ca, gov | |
| 3. Ray Kuztari | | 925-833-6634 | raz. Kuzla | ri Qci.dublin | ,ca.us |
| 4. H. David Ser | an ct | (510) 286-4653 | dov.d_Se | vianie det, ca | 900 |
| 5. ISSA BOUR | | (80)286-5220 | | ri@dot.ea | |
| 6. PHILLIP CO | , * | 510-286-598 | H PCOX @ | <u> داه ۲، د س.</u> | ye~ |
| 7. John McKenza | | 5/6 286-5776 | Join McKer | ion dot an | 901- |
| 8. JEFF KNOWLE | | U 925 9315677 | | | / |
| 9. Rabindia Prittage | | | | | |
| 10. Gui Shear | .4 | 415 227-851 | 7 Guillaume S | hearin @ par | 5MS.60M |
| 11. dale Hart | | | | | |
| 12. For Stev | | | | | |
| 12. | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| | | | | | |
| 16 | | | | | |
| 17 | | | | | |
| 18 | | | | . • | |
| 19 | | | | | |
| 20 | | | <u> </u> | | |
| 21 | | | | | |

TRIANGLE TRAFFIC STUDY PAC Meeting Packet June 9, 2006

Agenda Item 4 – PAC Meeting Minutes

645176/224.01

PROJECT: Tri-Valley Triangle Traffic Study

SUBJECT: Policy Advisory Committee (PAC) Meeting

DATE: March 24, 2006

LOCATION: City of Dublin Library

100 Civic Plaza Dublin CA 94568

ATTENDEES: See attached sign-in sheet, Agenda, and attachments

MINUTES BY: Parsons

MEETING PURPOSE: The purpose of the meeting was to obtain the PAC's approval of the weights recommended by the TAC for the quantitative measures; the methodology for evaluating the quantitative measures; and the factors that will be used to evaluate the qualitative measures.

The following is a summary of the meeting. Action items are shown in **bold** and critical path items are in **bold and italicized**. Action items subsequently completed are in *italics*.

| AGENDA ITEM | DISCUSSION | ACTION |
|----------------|--|------------------------------------|
| 1 | Introductions The meeting began with all attendees introducing themselves. | |
| 2 | Public Comment There were no public comments. | |
| 3 | TAC Meeting Minutes The TAC Meeting minutes were provided as an information item to the PAC. There was no discussion. | |
| 4 | November 4, 2005 Meeting Minutes The minutes of the November 4, 2005 meeting were approved without comment. The motion was made to approve the minutes by Kamena and seconded by Hildebrand. | November 4, 2005 minutes approved. |
| 5 | Purpose of Study The agreed upon purpose of the study was provided as an information item to the PAC. It was noted that the outcomes of the study would: • Quantitative and qualitative analysis of the alternatives • Order of magnitude costs of alternatives • Recommendation for regional improvements in the Tri-Valley Area | |

- Phasing strategy for corridor improvements
- Recommended Implementation Plan

Based upon the analysis results, it is anticipated that a hybrid alternative may be developed that optimizes the combination of highway improvements in the Tri-Valley region.

6, 7 & 8 Alternatives, Status of Technical Studies, and Preliminary Results of Quantitative and Qualitative Measures of Effectiveness

Since the last PAC meeting, there has been a lot of work performed on the project. Key tasks completed include:

- Defined technical parameters for the models (ramp metering rates on I-580 and I-680)
- Ran draft initial model runs for Base Case, and Alternatives 1 and 6
- Analyzed model output and fine tuned the model
- Adjusted model to reflect higher truck percentages
- Reran alternatives using adjusted model
- Analyzed the results for Base Case, and Alternatives 1 and 6

Remaining work includes:

- Alternatives 1 and 6 AM peak hour: respond to TAC questions about analysis results
- Alternatives 2 through 5
 - Run CORSIM model
 - Analyze and evaluate data
- Develop methodology for evaluating costs and benefits
- Document technical findings

The key actions by the PAC prior to the meeting included the September 9, 2005 approval of the seven alternatives under study (provided to the PAC in graphic form in the advance meeting packet), and approval of the qualitative and quantitative measures of effectiveness (MOE) that define how well each alternative performs.

Quantitative MOEs

The quantitative MOEs previously agreed upon by the PAC were:

- Vehicle Hours of Delay
- Vehicle Miles of Travel
- Person Hours of Travel

- Average Travel Time
- Average Speed
- · Length of Queue

To generate data for the quantitative analysis, a three step traffic analysis process is being used. The process begins with generating traffic demand volumes for year 2030 from the travel demand model (TDM). These volumes are then fed into the corridor simulation model (CORSIM) for analyzing I-580 and I-680 as freeways and intersections along SR84. The constraints from the CORSIM analysis are then fed back into the TDM. The last two steps may require several iterations to provide data that makes sense. The consultant team and the TAC have spent a lot of time working together on this to ensure that there is a high level of comfort with how the model works and the results that are produced.

The TDM work is complete for all alternatives. In order to raise the TAC's comfort level, a higher level of validation was required than had been originally envisioned. Additionally, the model was adjusted to raise the anticipated percentage of trucks using the highways during the peak periods from four to eight percent.

The CORSIM modeling is complete for the Base Case and Alternatives 1 and 6. The consultant team is working to address a few outstanding questions from the TAC relating to the morning peak period results. The modeling for Alternatives 2 through 5 is in process. It should be noted that all results are considered Draft until the final report is issued.

Difference Plots

The PAC was provided copies of difference plots and bottleneck and queue diagrams for Alternatives 1 and 6. The difference plots show how much traffic increases or decreases compared to the base case. In the difference plots provided, red indicated an increase and green indicated a decrease in volumes for that alternative compared to the Base Case. It was noted that an increase in volume may be a good result; for example, if the alternative's improvements are such that traffic is attracted to I-580, I-680 or SR84 and results in increased traffic on these routes while decreasing diversionary traffic on local streets, the increased traffic volumes on the state routes would be a good result. Additionally, a decrease may not be a good result; for example, a decrease in the volumes on the state highway may result in an increase in diversionary traffic on a local street. In short, each result

Difference plots to

must be evaluated in context. The PAC requested that volumes at select locations be provided at a larger size on the plots.

The difference plots for Alternatives 1 and 6 in the PM peak period showed that improvements under both alternatives decreased diversion onto local streets and increased travel on the state routes compared to the base case. In Alternative 1 in the PM peak period, eastbound traffic is attracted by the improvements to SR84 and increased state route volumes are shown on eastbound SR84 and eastbound I-580 east of Isabel Avenue. In Alternative 6 in the PM Peak, the northbound I-680 HOV Lane improvement that connects to the eastbound I-580 HOV lane provided in the Base Case makes it very attractive for motorists to stay on the freeways and results in increased volumes on the freeways while diversionary traffic on local streets is reduced.

The PAC asked that a difference plot comparing the 2001 calibrated volumes and the 2030 forecasts.

Bottleneck and Queue Diagrams

Bottleneck and queue diagrams were provided for the Base Case and Alternatives 1 and 6 for the PM Peak Period. It was noted that bottlenecks were considered to be locations on the freeway where travel speeds were reduced to 15 mph or less. The analogy of an hour glass was used to explain the bottleneck; where there is a condition that restricts flow because the volume that wants to pass is greater than the restriction allows the traffic speeds are reduced and it is stored in the queue until it reaches the bottleneck and is then allowed to run free. The queues were considered to extend back from the bottleneck to a point where the speeds were greater than 30 mph.

In the Base Case, there are two bottlenecks on eastbound I-580 in the PM Peak Period. The first is at the Santa Rita Road Interchange exit ramp; traffic queues extend to the west beyond the I-580/I-680 Interchange. The second location is at the Isabel Avenue Interchange on-ramp from northbound Isabel Avenue; traffic queues extend west to the Airway Boulevard Interchange.

In Alternatives 1 and 6, the improvements would eliminate the bottleneck at Isabel Avenue. The bottleneck at Santa Rita Road would remain. In Alternative 1, the queue would be nearly identical to that in the Base Case. Under Alternative 6, there is slightly more queuing for the HOV at this location because of the added northbound I-680 HOV

show volumes at select locations in a larger font.

Provide a difference plot comparing 2001 calibrated volumes with 2030 forecast volumes.

delivers more HOV traffic with the improvements.

The PAC requested that the bottleneck and queue information be added to the plan view diagrams showing the alternatives.

Quantitative MOE Results

The quantitative MOEs will account for 70 percent of the overall rating of the alternative. The preliminary quantitative MOEs for the Base Case and Alternatives 1 and 6 were summarized in tabular form for both the AM and PM Peak Periods. The PAC requested that each MOE be reported by jurisdiction for both AM and PM peak periods, that volumes be presented in addition to percentages, and that text accompany the MOE to explain the result. They also requested that the words increase and decrease be used in the table (instead of plus and minus signs or up and down arrows) to describe the variation compared to the Base Case.

An additional measure that the ACCMA and consultant team felt was important to report, but was not an MOE identified by the PAC, is the regional miles of travel on regional facilities and on local facilities. This measure will be reported but will not receive a weighting factor in the overall evaluation.

Presenting the MOEs in graphical/chart form is considered desirable with decreases shown to extend below 0% and increases above 0%. Additionally, the PAC noted that they would prefer to see the travel time savings reported as a cumulative amount rather than by individual user.

Dublin requested that some additional select link type information be provided along Dublin Boulevard and Tassajara Road.

Qualitative MOEs

The qualitative MOEs will account for 30 percent of the overall rating of the alternative and are compared against the Base Case. The four qualitative MOEs adopted by the PAC are:

- Location of Bottlenecks
- Project Readiness
- Compatibility with other Planned Improvements
- Connectivity and Access

Preliminary Order of Magnitude Cost Estimates

Show bottleneck and queue information on alternative diagrams.

Consultant team to report MOEs by jurisdiction, AM and PM peak periods, and by number and percentage; explanatory text to accompany the MOE. The words increase and decrease be used in the MOE table to describe how the Alternative varies compared to the Base Case.

Present MOEs in chart form with decreases extending below 0% and increases extending above 0%.

Travel time savings to be reported as a cumulative amount.

Provide additional select link type information along Dublin Boulevard and Tassajara Road.

| | The preliminary order of magnitude cost estimates were made at a gross level and are provided as a way to compare alternatives, and are not the true estimated cost of the alternative. The costs were derived from readily available data. More detailed cost estimating will not be done as part of this project. The PAC requested that capital and support costs be included and that costs be available by component if a hybrid alternative is to be developed. It was noted that the cost information is available by component. Preliminary Comparison of Benefits and Costs At the November 2005 PAC meeting, the PAC requested that benefit to cost calculations be made. Many different factors could be considered. For the purposes of illustration, travel time cost savings were compared to estimated project costs using annualized capital costs. The cost savings in the comparison used an average of all components in the alternative package. The PAC requested that the benefit to cost comparison be modified to eliminate the value of an individual's time. It was agreed that the benefit-cost comparison would compare the hours saved to the annualized capital cost. | Order of magnitude cost estimates should include capital and support costs. Provide costs by component for developing a hybrid alternative. Revised benefit to cost comparison to compare hours saved |
|----|---|---|
| | | to the annualized capital cost. |
| 9 | Schedule The key milestones remaining in the schedule are: The quantitative results for all alternatives completed – May PAC Meeting. A Draft Phasing & Implementation Plan Strategy – May PAC meeting. Draft Report – June PAC Meeting Final Report – July 2006. This schedule was noted as being aggressive and | |
| | assumed that there would be no added glitches in the model work. Some of the above noted milestones may need to be adjusted if a hybrid alternative is considered. | |
| 10 | Other Business | |
| | There was no other business. | |
| 11 | Adjournment / Next Meeting | |

| The next PAC meeting was scheduled for May 11, 2006. (Note: Subsequent to the meeting, the meeting was cancelled and rescheduled for June 9, 2006.) | |
|---|--|
| The meeting was adjourned. | |





ALAMEDA COUNTY CONGESTION MANAGEMENT AGENCY

1333 BROADWAY, SUITE 220 ● OAKLAND, CA 94612 ● PHONE: (510) 836-2560 ● FAX: (510) 836-2185 E-MAIL: mail@accma.ca.gov ● WEB SITE: accma.ca.gov

TRI-VALLEY TRIANGLE STUDY POLICY ADVISORY COMMITTEE ROSTER OF ATTENDANCE MARCH 23, 2006 CMA OFFICES OAKLAND, CALIFORNIA

| JURISDICTION/ NAME ORGANIZATION PHONE # E-MAIL |
|--|
| 1 Lois Stevens Parsons 415495-6060 lois stevens@parsons.com |
| 2. Ja: Chan Parsons 415-455-6060 Kaischan@ parsons.com |
| 3. Januar Fay ACCMA |
| 4. JAM Argal Ala C BOS#1 510-272-6191 dAM Argale Dacquestore |
| 5. Of As KHAN Alamela County 510-670-5921 OBAID CARERWA. OBG |
| 6. MARSHALL KAMENA City of Liverione 925 9604091 |
| 7. Linda Barton Livernore C. Mag. 9259604051 |
| 8. Rob Vinn Livermore 925 960 4516 baylung Ci. livermore. ca. us |
| 9. JEFF KNOWLES PLEASANTON 9259315677 JKNOWLES @ CI. PLEASANTON-CA.C |
| 10. Someta Hostoman Pleasandy 931-5001 Thostoman @ " |
| 11. Cindy Mc Covern Pleasantin 931-5003 Concgovern 2" |
| 12. Nelson Falho Pheasaton. 931.5004 Afirtho eci. pleasator. ca. u |
| 13. ROB WILSON PLEASANTON 931-5653 ruilson @ 1. 11 ., |
| 14. Janes Jockhart Dublin 833-6650 janet. lockhartecidellin, Ca. U |
| 15. Hasie Hildenbrand Dublin 833-6665 Kasie hildenbrandaci dublin ca |
| 16. Hichaed Ambruse Dublin 833 6650 Rea@c: dublon Cee. US |
| 17. Melissa Morton Dublin 833-6630 melissa morton@ Ci. dublin .ca. us |
| 18 Ray Kuzbari Dublin 833-6634 ray, Kuzbari@ci.dublin.ca. U. |
| 19. Stefen Garcia Accoma |
| 20. Erik Alm Catheurs D4 Planning 510-286-6053 ealm@dot.ca.gov |
| 20. Erik Alm Cathans D4 Planning 510-286-6053 ealmondot.ca.gov 21. Lee Jaubeneen Cathan Adv. Pleng 5676 (ee:taubeneeh@ gov. |
| 22. ARTHUR DAO ACTA ACTIA 893-3347 adao@ acta 2002. Com. |
| 23. HAII that amo stalk |

TRIANGLE TRAFFIC STUDY PAC Meeting Packet June 9, 2006

Agenda Item 5 – Study Results

Quantitative Analysis

- Memorandum
- Bottleneck & Queue Diagrams
 - I-580 Westbound AM Peak Period
 - I-680 Southbound AM Peak period
 - I-580 Eastbound PM Peak Period
- Difference Plots (Each Alternative Compared to Base Case AM & PM Peak Periods)
- Difference Plots (2001 Volumes Compared to 2030 Forecast AM & PM Peak Periods)

Qualitative Analysis

• Memorandum



120 Howard Street, Suite 850 • San Francisco, California 94105 • (415) 227-6600 • Fax: (415) 546-1602 • www.parsons.com

Memorandum

TO: Tri-Valley Triangle Study Policy Advisory Committee

FROM: Parsons

DATE: June 1, 2006

SUBJECT: Tri-Valley Triangle Study – Summary of Model Results for Alternatives Future Base, 1,

2A, 2B_{AM}, 3, 4, 5, and 6

Executive Summary

This memo presents the travel demand (TransCAD) and traffic simulation (CORSIM) model results for Alternatives Future Base, 1, 2A, $2B_{AM}$, 3, 4, 5, and 6. These alternatives are defined by the Alternative Description and Operations Summary graphics in the PAC package, which also depict the traffic operations results. This Executive Summary gives the highlights of the results. The remaining sections add more detail. Tables 1 and 2 summarize the measures of effectiveness (MOEs) for the alternatives compared with the Future Base Alternative. These data will be presented in graphical form to the Policy Advisory Committee (PAC) on June 9, 2006.

Operations Results

Operations analysis with CORSIM yields the following results for Alternatives 1, 2A, $2B_{AM}$, 3, 4, 5, and 6 compared with the Future Base Alternative:

- Alternatives 1 and 5 improve I-580 freeway operations by shifting traffic to Route 84. The length of a southbound auxiliary lane on I-680 to merge Route 84 traffic is an important issue for performance and cost.
- Alternatives 2A and 2B improve operations on I-580 with a westbound HOV lane and a direct connection to I-680 southbound, but I-680 queuing becomes much worse.
- Alternative 3 improves the results of Alternatives 2A and 2B with a southbound I-680 HOV lane, although Route 84 at I-680 remains a serious bottleneck.
- Alternative 4 improves speeds up the Altamont Grade in the PM peak.
- Alternative 6 improves I-580 operations eastbound in the PM peak with an additional mixed flow lane.

Measures of Effectiveness

- Overall, the local jurisdictions have a 2% to 3% decrease in VMT from Alternatives 1, 2A. 3, 5, and 6, but it is very unevenly distributed.
- State route VMT changes from about -3% to +4% over all alternatives corresponding to capacity changes or changes in out-of-direction travel. These changes are relatively small.
- XX mileage (regional traffic on local facilities) is reduced by 2% to 11%—more with Alternatives 3, 5, and 6 than Alternative 1 by virtue of high reduction in VMT through Livermore.

Triangle PAC June 1, 2006

- Generally Alternatives 2A, 3, 5, and 6 achieve better results for the other measures of effectiveness than does Alternative 1. The measures are VHD, PHT, average travel time, average speed, and length of queues.
- Alternatives 1, 4, and 5 have similar costs per hour saved, ranging from \$4 to \$6 of annualized capital cost per hour of motorist time saved. Alternatives 2A, 3, and 6 have a cost per hour saved of \$10 to \$12/hour.

Overall Assessment

- The Route 84 alternatives, Alternatives 1 and 5, emerge as very strong contenders on the basis of performance and cost. Alternative 4 is also very cost effective.
- Alternatives 3 and 6 deliver comparable regional benefits but at a higher cost, while Alternatives 2A and 2B achieve somewhat less at relatively high cost.

Summary of CORSIM Analysis of Alternatives Compared with the Future Base Alternative

Alternative 1

- Alternative 1 improves operations in the AM westbound direction east of Isabel. This is a shifting
 of the I-580 bottleneck toward Santa Rita instead of its location at Isabel Avenue in the Future
 Base.
- The eastbound PM secondary bottleneck on I-580 at Isabel is absent compared with the Future Base because the mainline mixed-flow volumes are about 300 vph less.
- There is no operational problem in the eastbound AM direction on I-580.
- On I-680, there are no operational problems northbound; the northbound off-ramp volumes onto Route 84 are higher than in the Future Base. In the southbound direction, the mainline queue extends from Route 84 to Sunol because of the merge and high ramp metering rate (1,800 vph).

Alternative 2A

- Alternative 2A, the right-side direct connector between I-580 westbound and I-680 southbound, would have operations similar to the Future Base Alternative for all conditions except the westbound AM condition on I-580 and the southbound AM condition on I-680.
- For the westbound I-580 in the AM peak, the queue west of Isabel and the slowdown at El Charro experienced in the Future Base would disappear. Speeds would be 50 to 61 mph except for short sections approaching three interchanges (Isabel, Santa Rita, and I-680), where the speeds would drop to between 39 and 44 mph. The speed drop to 39 mph approaching the I-680/I-580 interchange would be the result of HOVs weaving over to the right side direct ramp to southbound I-680.
- On I-680 southbound in the AM peak, I-680 would operate well through the system interchange except for a queue north of the interchange similar to that in the Future Base Alternative. Moving most of the I-580 westbound to I-680 southbound movement to the direct connector would improve operations within the system interchange compared with the Future Base Alternative and would increase the ability of the interchange to serve the I-580 eastbound to I-680 southbound movement.
- The southbound queue at Route 84 would increase substantially due to the additional traffic on I-680 and would extend back to Stoneridge Drive. While increased traffic from the direct connector is the driving factor in the queuing compared with the Future Base Alternative, other important factors carried over from the Future Base Alternative include high future demand at the unmetered on-ramps through Pleasanton, a metering rate of 1,400 vph at the Route 84 southbound on-ramp, and no additional improvement to I-680.

Alternative 2B_{AM}

- Alternative 2B, the center direct connector between I-580 westbound and I-680 southbound, would have operations similar to the Future Base Alternative for all conditions except the westbound AM condition on I-580 and the southbound AM condition on I-680.
- For the westbound I-580 in the AM peak, the queue west of Isabel and the slowdown at El Charro experienced in the Future Base would disappear. Speeds would be 50 to 61 mph except for short sections approaching the Isabel interchange and within the El Charro interchange, where the speeds would drop to 43 mph. In addition, there would be a slowdown to 25 to 43 mph around the Hopyard interchange because of westbound through HOVs weaving out the HOV lane approaching the I-680/I-580 interchange to avoid being trapped in the lane going onto the direct ramp to southbound I-680.
- On I-680 southbound in the AM peak, I-680 would operate well through the system interchange except for a queue north of the interchange similar to that in the Future Base Alternative. Moving most of the I-580 westbound to I-680 southbound movement to the direct connector would improve operations within the system interchange compared with the Future Base Alternative and would increase the ability of the interchange to serve the I-580 eastbound to I-680 southbound movement.
- Similar to Alternative 2A, the southbound queue at Route 84 would increase substantially due to the additional traffic on I-680 and would extend farther back into the Stoneridge interchange than with Alternative 2A. The factors influencing the queue are the same as those described for Alternative 2A.

Alternative 3

- Alternative 3 would have operations similar to the Future Base Alternative for all conditions except the westbound AM condition on I-580 and the southbound AM condition on I-680.
- For the westbound I-580 in the AM peak, the queue west of Isabel and the slowdown at El Charro experienced in the Future Base would disappear. Speeds would be 50 to 61 mph except for short sections approaching the Isabel interchange and through the El Charro interchange, where the speeds would drop to 37 to 43 mph. As in Alternative 2B, there would be a slowdown around the Hopyard interchange because of westbound through HOVs weaving out the HOV lane approaching the I-680/I-580 interchange to avoid being trapped in the lane going onto the direct ramp to southbound I-680. In this case, the speeds would be somewhat lower at 17 to 37 mph.
- On I-680 southbound in the AM peak, I-680 would operate well through the system interchange except for a queue north of the interchange similar to that in the Future Base Alternative. Moving most of the I-580 westbound to I-680 southbound movement to the direct connector would improve operations within the system interchange compared with the Future Base Alternative and would increase the ability of the interchange to serve the I-580 eastbound to I-680 southbound movement.
- Similar to Alternatives 2A and 2B, the southbound queue at Route 84 would increase due to the
 additional traffic on I-680 but would not extend back as far, reaching the Bernal interchange. The
 factors influencing the queue are the similar to those described for Alternative 2A except that I680 has additional capacity from the southbound HOV lane.

Triangle PAC June 1, 2006

Alternative 4

- Alternative 4 has similar operations to the Future Base for all conditions except for the eastbound PM condition on I-580.
- For eastbound I-580 in the PM peak, Alternative 4 has improved operations east of Vasco Road compared with the Future Base, with no slow down eastbound on the Altamont Pass.
- There are similar AM slowdowns between El Charro and Santa Rita westbound under both the Future Base Alternative and Alternative 4. See the first bullet under Alternative 6 for additional information.

Alternative 5

- Alternative 5 improves operations in the AM westbound direction east of Isabel. This is a shifting
 of the I-580 bottleneck toward Santa Rita instead of its location at Isabel Avenue in the Future
 Base.
- The eastbound PM secondary bottleneck on I-580 at Isabel is absent compared with the Future Base because of added eastbound capacity between Isabel and Vasco.
- There is no operational problem in the eastbound AM direction on I-580.
- On I-680, there are no operational problems northbound; the northbound off-ramp volumes onto Route 84 are higher than in the Future Base. In the southbound direction, the mainline queue extends from Route 84 to Sunol because of the merge and high ramp metering rate (1,800 vph).

Alternative 6

- Alternative 6 has similar operations to the Future Base in the AM westbound and eastbound directions on I-580. Refinement of the AM travel demand for the Future Base Alternative resulted in similar slowdowns between El Charro and Santa Rita westbound under both the Future Base Alternative and Alternative 6. This congestion is the result of slightly higher westbound traffic volumes (less than 2% or 200 vph) than previously simulated for the Future Base Alternative combined with near capacity and unstable westbound AM conditions with high percentages of trucks under all of the alternatives.
- In the PM, I-580 is able to serve more HOV and mixed flow volumes, but congestion is higher between I-680 and Santa Rita because of the weaving and higher volumes. The eastbound PM secondary bottleneck at Isabel is absent compared with the Future Base because of additional capacity.
- On I-680 northbound in the PM, more HOV volumes are being served because of the extended HOV lane. The off-ramp volumes to Route 84 are similar to the Future Base because of the single lane off-ramp.
- There is no substantial difference in I-680 AM conditions compared with the Future Base.

Additional Information

- See the queuing files included in current 5-18-06 TAC packet and the 5-3-06 and other previous TAC packets for summary detail on lane geometry, traffic queuing, speed, and volumes. There is no queuing diagram for northbound I-680 because there are no operational problems. Item 3.f.i in the 5-3-06 TAC packet gave speed and LOS data for all CORSIM freeway results to illustrate the operations for sections for which no queuing diagram was considered useful. Similar files for Alternatives 2A, 2B, and 3 will be provided by the time of the 5-18-06 TAC meeting.
- The 4-4-06 TAC packet gave the PM difference plots for Alternatives 1 and 6 compared with the Future Base Alternative. Difference plots for Alternatives 4 and 5 were included in the 5-3-06 TAC

- packet, while those for Alternatives 2A, 2B, and 3 are included in the current 5-18-06 TAC packet. These are from the travel demand model after CORSIM results are included.
- The AM difference plots in the 4-4-06 TAC packet had been revised per a preliminary estimate of the westbound I-580 AM operations. There were several features of the plots that required explanation and were the subject of questions in the 3-13-06 TAC meeting. These are addressed by the following bullets (repeated from the 4-4-06 memorandum):
 - The plots already suppress any bandwidths for differences of less than 100 vehicles per hour. This occasionally leads to diversions that appear discontinuous, but the differences shown are not "noise" but valid shifts in demand. The numbers for all differences, however, are printed by direction next to each arterial and freeway, so the diversions can be tracked more closely if the plots are blown up to allow the numbers to be read.
 - On the freeways, the differences for the HOV lanes are plotted on the outside of the freeway because there is no room to show them in the middle. The HOV differences can appear to be for a parallel frontage road if the plots are not read carefully. There was a question about this for the Alternative 1 PM peak between El Charro and Airway eastbound, where there is no parallel through frontage road. The Cube plot files are attached for those who would like a closer look.
 - In Alternative 1 AM eastbound conditions on I-580, there are diversions to Dublin Boulevard compared with the Future Base because of the queue moving west under Alternative 1. There is a slowdown or secondary bottleneck between El Charro and Santa Rita under both the Future Base Alternative and Alternatives 4 and 6, as explained under Alternative 6 in the first section of this memo. With this slowdown appearing in both cases, the AM Alternative 6 difference plot (as well as the new Alternative 4 AM plot) now has no diversion to Dublin Boulevard compared with the Future Base. Also the westbound diversions to Dublin Boulevard under Alternative 1 are somewhat less than previously shown as a result of a more congested Future Base.
 - Under both Alternative 1 and 6 difference plots for the PM peak hour, there are diversions shown from Central Parkway with the added Route 84 or I-580 freeway eastbound capacity. While it would appear that diversion should come only from Dublin Boulevard because it is the primary parallel arterial to I-580, the plots show valid trends. This is because the demand for Dublin Boulevard is over capacity to the point that while there would be traffic shifting from Dublin Boulevard to the freeway with the added capacity eastbound, there is no net relief because of the overflow to Central Parkway that returns to Dublin Boulevard.
 - On the difference plots for the Alternative 1 AM and both the Alternative 4 and 6 PM peak hours, there are differences shown on Altamont Pass Road and Carroll Road that are parallel to I-580 between North Flynn Road and Greenville Road. Carroll Road is the right side of the inverted "Y" formed just north of I-580 between North Flynn and Greenville Roads, while Altamont Pass Road forms the stem and left side of the "Y."
 - In the Alternative 1 AM case, there is a decrease in westbound traffic bypassing the freeway from North Flynn Road to Greenville Road via Carroll Road and Altamont Pass Road due to less congestion on I-580 westbound with the queuing moving west of Isabel. At the same time, there is an increase in traffic from Altamont Pass Road accessing I-580 at North Flynn Road via eastbound Carroll Road because of better conditions on westbound I-580.
 - In the Alternative 4 and 6 PM cases, there is a decrease in eastbound traffic on the left leg of Altamont Pass Road. This traffic appears as an increase on eastbound I-580 and westbound Carroll Road. In all of these cases, there is

PARSONS

more traffic using I-580 instead of diverting to Altamont Pass Road to/from Greenville Road as a reliever route.

- There were several questions on the difference plots in presented in the 4-11-06 TAC meeting, as follows, with the answers in *italics*. Missing answers were provided at the 5-3-06 TAC meeting as follows:
 - Why no diversion to the County roads parallel I-680 near Route 84 in Alt 1 as expected and yet as appears on Alternative 5? We think there was a speed difference in an earlier run of Alternative 1 AM that caused this; this plot was rerun with the most current data, which fixed the problem.
 - Why on AM Alternative 6 is there some increase in diversion to Stoneridge? Is it because of the system metering interchange, congestion/lane drop on I-580 close to the system interchange, or both? I-680 NB slows down to 11-14 mph between the Stoneridge off-ramp and I-580. The diversion to Stoneridge are NB I-680 SOV vehicles avoiding that queue.
 - Why is there an increase in diversion in east Livermore under Alternative 5 PM? This is just traffic shifting around with a net decrease on Livermore streets parallel the freeway. That is, Los Positas Road shows an increase of over 100 vph but Patterson Pass Road shows a much larger decrease.
 - Alternative 4 AM shows no difference from the base. CORSIM shows some slight differences, mainly more congestion on I-580 in the slow down area around El Charro WB. Is this not enough to trigger any diversion? The westbound diversion in Alternative 4 AM was eliminated in the difference plot as part of Kym's reasonableness check since there were no project changes westbound with the eastbound truck climbing lane. We could rerun this plot strictly following the CORSIM results if necessary.

Alternative 4 Lane Drop at North Flynn

- We have completed analysis of Alternative 4 (adding truck climbing lane from truck scale and dropping after Flynn off-ramp). By adding a truck climbing lane, the average speeds between Greenville Road I to Flynn Road were increased from 35 mph to 50 mph. When we drop a lane after Flynn Road off-ramp (5 mix-flow lanes becomes 4-mix flow lanes), the first 2,500 feet segment speed drops from 50 mph to 40 mph then it goes back to 60 mph. The next interchange (Grant Line) is about 4 miles from Flynn Road.
- In conclusion, truck climbing lane improves traffic flow from Greenville to Flynn and the lane drop Flynn does not affect traffic flow. This assumption is based constrained conditions from bottlenecks at the Santa Rita and Isabel interchanges.

Summary of Measures of Effectiveness – Table 1 and Table 2

VMT Summary

• Dublin shows increased VMT in the AM under Alternative 1 because of the traffic diverting from the westbound freeway to Dublin Boulevard. This is a result of the westbound bottleneck shifting westward from Isabel toward Santa Rita under Alternative 1. Trucks are a major factor in causing this westbound AM bottleneck. Over half of the AM VTM increase is due to additional regional traffic on Dublin streets (Table 2). Over both peak hours, there is a small net decrease in VMT for Dublin under Alternative 1; Alternative 5 results are similar while Alternative 4 shows an even smaller VMT decrease and Alternative 6 shows a slightly larger VMT decrease. Alternatives 2A, 2B, and 3 show the largest VMT decrease in Dublin as a result of improved westbound I-580

- operations in the AM peak.
- Alameda County has slightly negative VMT (good) with Alternatives 1, 3, and 5; a slightly larger decrease with Alternative 6; a slight increase with Alternative 4; and about 1% increases with Alternatives 2A and 2B. The Alternative 4 increase is the result of increased regional traffic on County roads (Table 2). All alternatives have slightly positive VMT effects, i.e., reductions, on the other local jurisdictions.
- Livermore benefits most from Alternative 6 with a 5.2% reduction in VMT, but Alternative 5 gives almost as much reduction (4.8%), and Alternatives 2A, 2B, and 3 give reductions in the 3% range. Livermore would have a 2.0% reduction in VMT from Alternative 1 and less than 1% with Alternative 4.
- Pleasanton would have a 3.2% reduction in VMT from Alternative 1 and about the same under Alternative 5. Alternatives 3 and 6 would give Pleasanton a VMT reduction of about 2%, while the Pleasanton reduction under Alternatives 2A, 2B, and 4 would be much smaller.
- Overall, the local jurisdictions have a 2% to 3% decrease in VMT from Alternatives 1, 2A. 3, 5, and 6, but it is very unevenly distributed as noted above. Alternative 4 would reduce VMT for local jurisdictions by about 0.3%. Alternative 2B is not complete (PM case needs discussion), but the AM results are similar to Alternative 2A, so the overall reductions will probably be in the 2% to 3% range.
- State route VMT changes from about -3% to +4% over all alternatives corresponding to capacity changes or changes in out-of-direction travel. These changes are relatively small and are highest for Alternatives 3 (3.1%) and 6 (3.9%), the only alternatives for which total VMT is increased. The changes in the AM and PM peaks are quite different, with one peak period being affected much more than the other. Alternatives 2A, 2B, 3, and 4 have their predominant effect in the AM peak while Alternatives 1, 5, and 6 primarily change VMT in the PM peak.
- State route VMT drops slightly for Alternative 1 and increases for Alternative 5, leading to an overall decrease in VMT of less than 1%. This decrease is the consequence of less diversion and less out of direction travel under Alternatives 1 and 5 compared the Future Base Alternative.
- XX mileage (cut through VMT) is down about 2% to 11%—more with Alternatives 3, 5, and 6 than Alternative 1 by virtue of high reduction in VMT through Livermore. Alternative 4 would reduce XX mileage less than 2%, while Alternatives 2A and 2B would achieve reductions of about 4% (Alternative 2B does not yet reflect any results for the PM peak).
- See Table 2 for a distribution of XX mileage by jurisdiction.



| Alternative | Peak hour period | Vehicle Miles of Travel (VMT) by Jurisdiction | | | | | | | | Vehicle Hours Delay (VHD) | Person Hours of Travel (PHT) | Average Travel Time (hr) | Average Speed (mph) | Length or Queues (mi) |
|---|---|---|---------|-----------|------------|-----------|--------------|-----------|--|------------------------------|------------------------------------|--------------------------------|------------------------|-----------------------------|
| | | Alameda County | Dublin | Livermore | Pleasanton | CC County | State Routes | Total VMT | XX on Non- State Routes (regional traffic traveling on the local system) | Total | Total | Total | Total | Freewy |
| Future Base Case | AM | 70,883 | 64,835 | 119,533 | 97,791 | 2,785 | 353,261 | 709,088 | 38,632 | 9,980 | 28,830 | 26,203 | 27.1 | 6.43 |
| | PM | 84,650 | 76,828 | 136,593 | 106,150 | 4,067 | 329,585 | 737,873 | 54,056 | 13,766 | 34,940 | 31,652 | 23.3 | 4.46 |
| | AM-PM Base Case total | 155,533 | 141,664 | 256,126 | 203,942 | 6,852 | 682,846 | 1,446,961 | 92,688 | 23,747 | 63,770 | 57,855 | 25.2 | 10.88 |
| Alt. 1 Widen SR 84 from I-680 to Pigeon Pass; modify SR84/ I-680; add I-580 WB HOV lane from Greenville to Isabel. | AM | 164 | 615 | -2,436 | -4,147 | 3 | -2 | -5,802 | -1,935 | 625 | 875 | 588 | -0.8 | 2.11 |
| | PM | -681 | -1,533 | -2,642 | -2,585 | 3 | 4,627 | -2,811 | -3,294 | -1,946 | -2,408 | -2,619 | 2.0 | -1.21 |
| | % Change (AM+PM / Base Case AM+PM) | -0.3% | -0,6% | -2.0% | -3.3% | 0.1% | 0.7% | -0.6% | -5.6% | -5.6% | -2.4% | -3.5% | 2.4% | 8.3% |
| Alt. 2a Add I-580 WB HOV lane to two lane direct connector (1 MF/1 HOV) to I-680 SB HOV on right side. | AM | 1,950 | -3,573 | -8,361 | -518 | 6 | 5,370 | -5,126 | -3,335 | -1,852 | -1,554 | -1,921 | 1.9 | 0.37 |
| | РМ | -300 | 27 | -107 | -1,556 | -3 | -1,915 | -3,853 | -408 | -576 | -507 | -609 | 0.3 | -0.30 |
| | % Change (AM+PM / Base Case AM+PM) | 1.1% | -2.5% | -3.3% | -1.0% | 0.1% | 0.5% | -0.6% | -4.0% | -10.2% | -3.2% | -4.4% | 4.5% | 0.6% |
| Alt. 2b Add I-580 WB HOV lane to two lane direct connector (1 MF/1 HOV) to I-680 SB HOV median to median. | АМ | 1,570 | -3,502 | -8,590 | -141 | 4 | 1,650 | -9,009 | -3,650 | -1,475 | -1,190 | -1,605 | 1.4 | 1.80 |
| | PM | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | % Change (AM+PM / Base Case AM+PM) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Alt. 3 Add I-580 WB HOV lane to two lane direct connector (1 MF/1 HOV) to I-680 SB HOV median to median and I-680 SB HOV from Alcosta to SR84. | AM | -884 | -2,534 | -9,211 | -2,450 | 37 | 18,972 | 3,931 | -7,692 | -2,620 | -1,774 | -2,580 | 3.1 | -0.82 |
| | PM | -123 | 294 | -203 | -2,287 | 0 | 2,145 | -174 | 145 | -789 | -411 | -773 | 0.6 | -0.82 |
| | % Change (AM+PM / Base Case AM+PM) | -0.6% | -1.6% | -3.7% | -2.3% | 0.5% | 3.1% | 0.3% | -8.1% | -14.4% | -3.4% | -5.8% | 7.3% | -15.0% |
| Alt. 4 Add I-580 EB truck climbing lane from truck scale to N. Flynn. | AM | -30 | 0 | -90 | -6 | 0 | -13,501 | -13,627 | -25 | -210 | -338 | -317 | -0.2 | 0.43 |
| | PM | 487 | -68 | -1,807 | -687 | -7 | -6,838 | -8,920 | -1,445 | -353 | -552 | -487 | 0.1 | 0.04 |
| | % Change (AM+PM / Base Case AM+PM) | 0.3% | 0.0% | -0.7% | -0.3% | -0.1% | -3.0% | -1.6% | -1.6% | -2.4% | -1.4% | -1.4% | -0.2% | 4.3% |
| Alt. 5 Widen SR 84 from I-680 to Pigeon Pass; modify SR84/ I-680; add I-580 WB HOV lane from Greenville to Isabel; add I-580 EB mixed flow lane from Isabel to Vasco. | АМ | -78 | 269 | -3,813 | -4.264 | 7 | 1,081 | -6,798 | -2,666 | -258 | 26 | -324 | 0.1 | 0.54 |
| | PM | -811 | -972 | -8,579 | -2,515 | 5 | 16,856 | 3,984 | -6,007 | -3,655 | -3,538 | -3.798 | 3.3 | -0.82 |
| | % Change (AM+PM / Base Case AM+PM) | -0.6% | -0.5% | -4.8% | -3.3% | 0.2% | 2.6% | -0.2% | -9.4% | -16.5% | -5.5% | -7.1% | 6.7% | -2.6% |
| Alt 6 Add I-680 NB HOV lane and "close the gap"; add mixed flow lane from Tassajara to Vasco. | AM | -1,211 | -267 | -1,523 | -1,540 | -2 | -1,429 | -5,973 | -1,656 | -564 | -261 | -489 | 0.3 | -1.03 |
| | PM | -1,476 | -1,399 | -11,868 | -2,183 | -9 | 28,483 | 11,549 | -8,379 | -3,253 | -2,789 | -3,205 | 3.0 | -0.65 |
| | % Change (AM+PM / Base Case AM+PM) | -1.7% | -1.2% | -5.2% | -1.8% | -0.2% | 4.0% | 0.4% | -10.8% | -16.1% | -4.8% | -6.4% | 6.6% | -15.5% |

Footnotes:

1) "." regative means a reduction as compared to the future base case, and the number represents the unit of change.

2) "" positive means an increase as compared to the future base case, and the number represents the unit of change.

3) Trip table is held constant for these runs, although the number of vehicles served in CORSIM varies by alternative.

4) Average travel time is defined as vehicle hours traveled from the combined CORSIM and travel demand models for the total network.

| | | F | Regional T | raffic - Ve | hicle Miles | of Travel | (XX VMT) b | y Jurisdio | etion |
|--|---|-------------------|------------|-------------|-------------|-----------|--------------|------------|--|
| Alternative | Peak hour period | Alameda County | Dublin | Livermore | Pleasanton | CC County | State Routes | Total VMT | XX on Non- State Routes (regional traffic traveling on the local system) |
| | AM | 15,445 | 6,716 | 8,080 | 7,254 | 1,136 | 267,587 | 306,219 | 38,632 |
| Future Base Case | PM | 19,889 | 8,366 | 17,775 | 6,398 | 1,628 | 299,111 | 353,167 | 54,056 |
| | AM-PM Base Case total | 35,335 | 15,083 | 25,855 | 13,652 | 2,764 | 566,698 | 659,386 | 92,688 |
| Alt. 1 | AM | 56 | 285 | -144 | -2,136 | 4 | 1,257 | -678 | -1,935 |
| Widen SR 84 from I-680 to Pigeon Pass; modify SR84/ | PM | -255 | -1,296 | -970 | -775 | 1 | 2,723 | -571 | -3,294 |
| -680; add I-580 WB HOV lane from Greenville to Isabel. | % Change (AM+PM / Base Case AM+PM) | -0.6% | -6.7% | -4.3% | -21.3% | 0.2% | 0.7% | -0.2% | -5.6% |
| | AM | 1.555 | -819 | -3.440 | -641 | 10 | 4.002 | 667 | -3,335 |
| Alt. 2a Add I-580 WB HOV lane to two lane direct connector (1 MF/1 HOV) to I-680 SB | PM | -315 | 84 | 259 | -433 | -2 | 590 | 182 | -408 |
| HOV on right side. | % Change (AM+PM / Base Case AM+PM) | 3.5% | -4.9% | -12.3% | -7.9% | 0.3% | 0.8% | 0.1% | -4.0% |
| Alt. 2b | AM | 1,272 | -804 | -3,708 | -419 | 10 | 4,504 | 855 | -3,650 |
| Add I-580 WB HOV lane to two lane direct connector (1 MF/1 HOV) to I-680 SB | PM* | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| HOV median to median. | % Change (AM+PM / Base Case AM+PM) | 3.6% | -5.3% | -14.3% | -3.1% | 0.4% | 0.8% | 0.1% | -3.9% |
| Alt. 3 Add I-580 WB HOV lane to | AM | -635 | -853 | -4,579 | -1,662 | 38 | 20,242 | 12,550 | -7,692 |
| two lane direct connector (1 MF/1 HOV) to I-680 SB HOV median to median | PM | 27 | 132 | 776 | -788 | -2 | 6,076 | 6,221 | 145 |
| and I-680 SB HOV from Alcosta to SR84. | % Change (AM+PM / Base Case AM+PM) | -1.7% | -4.8% | -14.7% | -17.9% | 1.3% | 4.6% | 2.8% | -8.1% |
| | AM | -6 | 0 | -15 | -4 | 0 | 28 | 3 | -25 |
| Alt. 4 Add I-580 EB truck climbing | PM | 446 | -186 | -1,371 | -330 | -4 | 1,614 | 170 | -1,445 |
| lane from truck scale to N. Flynn. | % Change (AM+PM / Base Case AM+PM) | 1.2% | -1.2% | -5.4% | -2.4% | -0.2% | 0.3% | 0.0% | -1.6% |
| Alt. 5 Widen SR 84 from I-680 to | AM | -108 | 290 | -849 | -2,007 | 7 | 1,830 | -837 | -2,666 |
| Pigeon Pass; modify SR84 - -680; add I-580 WB HOV ane from Greenville to | PM | -318 | -295 | -3,695 | -1,703 | 3 | 5,023 | -984 | -6,007 |
| Isabel; add I-580 EB mixed flow lane from Isabel to Vasco. | % Change (AM+PM / Base Case AM+PM) | -1.2% | 0.0% | -17.6% | -27.2% | 0.4% | 1.2% | -0.3% | -9.4% |
| | AM | -874 | -63 | -177 | -538 | -3 | 3,576 | 1,920 | -1,656 |
| Alt 6 Add I-680 NB HOV lane and | PM | -862 | -541 | -5,874 | -1,105 | 3 | 15,016 | 6,637 | -8,379 |
| "close the gap"; add mixed flow lane from Tassajara to Vasco. | % Change (AM+PM / Base Case AM+PM) | -4.9% | -4.0% | -23.4% | -12.0% | 0.0% | 3.3% | 1.3% | -10.8% |

Footnotes:

1) "." negative means a reduction as compared to the future base case, and the number represents the unit of change.

2) "*" positive means an increase as compared to the future base case, and the number represents the unit of change.

3) Trip table is held constant for these runs, although the number of vehicles served in CORSIM varies by alternative.

4) Alternative 2B PM results are prior to CORSIM feedback and hence preliminary.

Other MOE Summary

- Generally Alternatives 2A, 3, 5, and 6 achieve better results for the other measures of effectiveness than does Alternative 1. Alternatives 1, 2A, 3, 5, and 6 achieve better overall results than Alternative 4, although Alternative 4 has less increase in queuing than Alternative 1. The measures are VHD, PHT, average travel time, average speed, and length of queues.
- Alternative 2B is incomplete, with discussion needed with the TAC on the level of effort that is reasonable for Alternative 2B_{PM}, which should have relatively little impact but shows random variations in results (noise).
- Only Alternatives 3, 5, and 6 achieve a net daily reduction in queue lengths. Alternatives 1, 2A, 2B, and 4 have increases, largely because of the increased AM queuing, but when the qualitative assessment of queues on Route 84 is added for Alternatives 1 and 5, they also achieve a net reduction in queues.
- As per the PAC recommendation on 3-24-06, average travel time is shown as total vehicle travel time. This is computed from both CORSIM and the travel demand model for the total network to give total hours saved.

Benefit-Cost / Cost-Effectiveness Measures

Per direction of the TAC on 4-11-06, the following tabulation gives estimated cost-effectiveness ratios for the alternatives analyzed so far. It is based on the 2030 measures of effectiveness, the average capital cost estimates, and annualization of costs over 20 years. Ranking the alternatives by cost per hour saved gives the same ranking as by benefit-cost ratio but without having to estimate a value of time for motorists. Alternatives 1, 4, and 5 have similar costs per hour saved, although Alternative 5 is the best and Alternative 1 is the worst of these three alternatives. Alternatives 2A, 3, and 6 have a cost per hour saved of more than twice that of the Alternatives 1, 4, and 5. The high costs per hour results are largely the result of costs that are much higher than the other alternatives.

| | Tabl | e 3: Cost-Effec | tiveness | of Alternatives | |
|-------------|---------|-----------------|----------|--------------------|-----------|
| | Time \$ | Savings (hrs) | Capita | al Cost (Millions) | Cost/Hour |
| Alternative | Daily | Annual (M)* | Total | Annualized | Saved |
| 1 | 2,031 | 2.4 | \$145 | \$13.7 | \$5.76 |
| 2A | 2,531 | 3.0 | \$325 | \$30.7 | \$10.36 |
| 2B** | N/A | N/A | \$360 | \$34.0 | N/A |
| 3 | 3,353 | 3.9 | \$490 | \$46.3 | \$11.79 |
| 4 | 804 | 0.9 | \$45 | \$4.2 | \$4.52 |
| 5 | 4,122 | 4.8 | \$200 | \$18.9 | \$3.91 |
| 6 | 3,695 | 4.3 | \$465 | \$43.9 | \$10.15 |

^{*}Conversion factor from hourly to annual = 1,170 = daily * 4.5 peak directional hours per day * 5 days per week * 52 weeks per year.

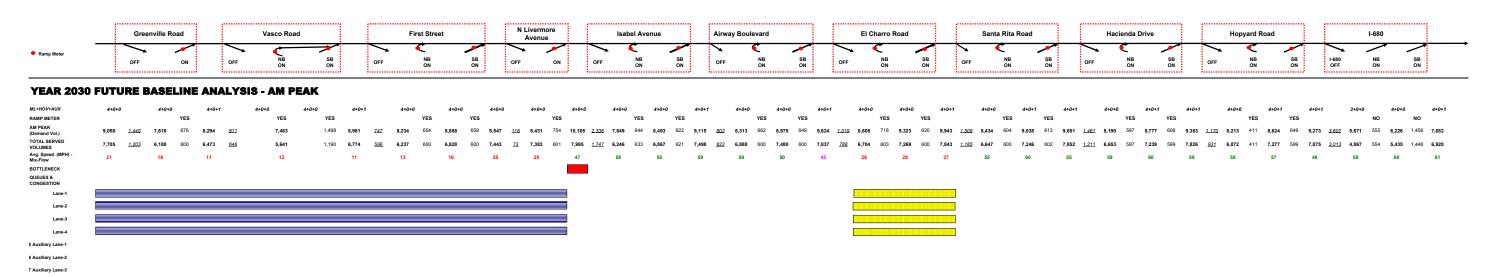


^{** 2}B results are currently incomplete but will be similar to 2A.

TRIANGLE TRAFFIC STUDY I-580 Westbound Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations Year 2030 - PM Peak BASELINE ALTERNATIVE

1

Queue
Slow Moving Traffic
XXXX Mainline Volume
XXXX On-Ramp Volume
XXXX Off-Ramp Volume



I-580 Westbound Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations Year 2030 - AM Peak ALTERNATIVE 1

1-360 WEST BOOM

| | Greenville | Road | | Vasco Road | | | First Street | | | ermore enue | | Isabel Avenu | ie | Airway | Boulevard | | | El Charro Roa | ad | | Santa Rita Roa | d | | Hacienda Driv | ve | | Hopyard Road | i | | I-680 | | |
|------------|------------|------|---------|-----------------|-----|---------|--------------|----|-----|----------------|-----|--------------|----|--------|-----------|----|-----|---------------|----|-----|----------------|----|-----|---------------|-----|-----|--------------|----|-------|-------|----|--|
| Ramp Meter | | | <i></i> | V _{NR} | SB. | | NR. | SB | 1 | - | 1 | NR. | SB | 1 | NR. | SR | 1 | NR NR | SB | _ | NR. | SB | 1 | € NR | SB. | 1 | NR NR | SB | 1.680 | NR. | SB | |
| | OFF | ON | FF | ON | ON | OFF | ON ON | ON | OFF | ON | OFF | ON | ON | OFF | ON | ON | OFF | ON | ON | OFF | ON | ON | OFF | ON | ON | OFF | ON | ON | OFF | ON | ON | |

| YEAR 2030 | ALTERNATIVE | 1 ANALYSIS | - AM PEAK |
|-----------|--------------------|------------|-----------|

| ML+HOV+AUX | 4+0+0 | | 4+1+0 | 4+1- | +1 | 4+1+0 | 4+1+0 | 4+1+1 | 4+1+0 | , | 4+1+0 | 4+1+0 | 4+1+0 | 4+1 | +0 | 4+1+0 | 4+0+0 | 4+0+1 | | 4+0+0 | 4+0+0 | 4+0+1 | 4+0+ | +0 | 4+0+0 | 4+0+1 | 4+0+0 | 4+ | 0+1 | 4+0+1 | 4+0+0 | 4+0 | 0+1 | 4+0+1 | 4+0+0 | 4+0+ | +1 | 4+0+1 | 3+0+0 | 4+0+0 | 4+0 | 0+1 |
|---|----------------|-----------------|---------------|----------------|-----|----------------|-------|----------------|----------------|-------|----------------|----------------|-----------|----------|-----------------|------------------|-------|-----------|--------------|-----------|-------|-----------|--------------------|-------|----------|----------|-------------|---------|----------------|--------------------|-------|---------|--------|-------------------|----------------|-------------------|--------------|-------------------|------------------|----------|------------|-----|
| RAMP METER | | | YES | 3 | | YES | YES | | | YES | YES | 5 | | YES | | YES | S | YES | | YES | ١ | YES | | YES | YE | ES | | YES | YES | | | YES | YES | | | YES | YES | | | 10 | NO | |
| AM PEAK (Demand Vol.) | 9,294 <u>1</u> | <u>,440</u> 7,8 | 54 689 | 8,543 | 848 | 7,695 | 1,550 | 9,245 <u>6</u> | 21 8,624 | 667 | 9,291 670 | 9,961 | 120 9,841 | 756 10,5 | 97 <u>2,650</u> | 7,947 613 | 8,560 | 637 9,197 | <u>826</u> 8 | 8,371 662 | 9,033 | 651 9,684 | <u>1.099</u> 8,585 | 5 642 | 9,227 62 | 29 9,856 | 1,591 8,265 | 604 8,8 | 369 618 | 9,487 <u>1,474</u> | 8,013 | 587 8,6 | 00 609 | 9,209 <u>1.19</u> | <u>0</u> 8,019 | 443 8,462 | 2 650 | 9,112 3,42 | 9 5,683 5 | 71 6,254 | 1,461 7,74 | 15 |
| TOTAL SERVED VOLUMES | 8,744 <u>1</u> | 121 7,6 | 23 436 | 8,059 | 786 | 7,273 | 1,161 | 8,434 7 | 19 7,715 | 490 8 | 8,205 359 | 8,564 | 212 8,352 | 387 8,73 | 9 1.792 | 6,947 315 | 6,632 | 564 7,196 | <u>823</u> 6 | 6,373 502 | 6,875 | 550 7,425 | 906 6,519 | 9 590 | 7,109 56 | 62 7,756 | 801 6,621 | 666 7,2 | 224 666 | 7,814 <u>666</u> | 6,603 | 666 7,1 | 89 595 | 7,791 <u>625</u> | 6,838 1 | ,078 7,269 | 9 1,596 | 7,875 <u>1,59</u> | 4,945 5 | 23 5,487 | 244 6,91 | .05 |
| AM PEAK (Served Vol.)- Mix-Flow Vol. AM PEAK | | 6,4 | 16 | 6,792 1,267 | | 6,050 1,223 | | 7,109 | 6,343 1,372 | | 6,786 1.419 | 7,006 1,558 | 6,790 | | | 6,947 | 6,632 | | | | | | | | | | | | | | | | | | | | | | | | | |
| (Served Vol.)- HOV Vol. | U | 1,2 | U/ | 1,207 | | 1,223 | | 1,325 | 1,372 | 1 | 1,419 | 1,000 | 1,362 | 1,38 | ıu . | U | U | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ava Coood (MDU) Mix Flow | 57 | 61 | 1 | 60 | | 60 | | 43 | 20 | | 20 | 18 | 15 | 23 | | 15 | 17 | 16 | | 15 | 16 | 16 | 15 | | 18 | 20 | 55 | | 8 | 57 | 60 | 60 | 1 | 60 | 58 | 56 | | 48 | EO | 60 | 6/ | 4 |

QUEUES & CONGESTION HOV Lane

> Lane-1 Lane-2 Lane-3

Lane-5 Auxiliary Lane-1 Lane-6 Auxiliary Lane-2

> LEGEND Bottlened

Slow Moving Traffic

XXXX Mainline Volume

XXXX On-Ramp Volume

I-580 WESTBOUND



| | Greenv | ille Road | | Vasco Road | | | First | Street | | N Live Ave | | | Isab | bel Avenue | | Airway E | oulevard | | El Charro Ro | ad | Santa Rita Ro | ad | | Hacienda D | Orive | | Hopyard R | ad | | I-680 | | |
|------------|--------|-----------|-----|------------|----------|-----|-------|----------|----------|---------------|----|---|------|------------|------|----------|----------|----------|--------------|----|---------------|----|---|------------|----------|---|-----------|----------|---|----------|----------|--|
| Ramp Meter | OFF | ON | OFF | NB ON | SB ON | OFF | . « | NB ON | SB ON | OFF | ON | 0 | FF | NB ON | - cn | | | SB ON | NB ON | _ | NB ON | | _ | ND. | SB ON | _ | _ | SB ON | _ | NB ON | SB ON | |

| VEAD 2020 | ALTERNATIVE 2 | DA ANAI VEIR | _ AM DEAK |
|-----------|---------------|--------------|-----------|
| | | | |

| ML+HOV+AUX | 4+0+ | 0 | 4+1+0 | | 4+1+1 | 4+1+0 | 4+1+ | 0 | 4+1+1 | 4+1- | ю | 4+1+0 | 4+1+ | , | 4+1+0 | 4+1+0 | 4+1+0 | 4+1- | +0 | 4+1+1 | 4+1+0 | 4+1 | +0 | 4+1+1 | 4+1+0 | 4+1+0 | | 4+1+1 | 4+1+0 | 4+1+1 | 4+1+ | 1 44 | 1+0 | 4+1+1 | 4+1+1 | | +0+0 | 4+0+1 | 4+0+ | 1 3+ | +0+0 | 4+0+0 | 4+0+1 |
|---|-------|--------------|----------------|-------|-------------------|-------|------|-------|----------------|------------------|-----|----------------|------------------|-----|----------------|-------------------------------|---------|-----------------|-------|------------------|----------------|-----------------|-------|---------------------|----------------|-----------------|-------|--------------------|-----------------|----------------|-----------|------------------|----------------|---------|----------|---------|------------------|-------|------------------|-------------------------|----------------|-----------|----------|
| RAMP METER | | | | YES | | YE | S | YES | | | YES | | YES | | Y | ES | , | YES | YES | | | YES | YES | | YI | ES | YES | | YE | 3 | YES | | YES | YI | ES | | YES | ١ | /ES | | NO | N | .0 |
| AM PEAK (Demand Vol.) | 9,362 | <u>1,440</u> | 7,922 | 698 8 | 3,620 <u>78</u> - | 4 7,8 | 16 | 1,587 | 9,423 | <u>597</u> 8,826 | 690 | 9,516 | 677 10,194 | 126 | 10,067 7 | 56 10,823 <u>2,416</u> | 8,407 | 664 9,07 | 1 666 | 9,737 <u>615</u> | 9,122 | 669 9,79 | 2 680 | 10,472 <u>1.115</u> | 9,356 6 | 43 9,999 | 739 1 | 0,738 <u>1,548</u> | 9,190 60 | 9,797 | 644 10,44 | <u>1.552</u> 8,8 | 388 587 | 9,475 6 | 10,116 | 2,428 7 | 822 579 | 8,401 | 647 9,048 | <u>3,422</u> 5,6 | 626 749 | 6,374 1,4 | 71 7,845 |
| TOTAL SERVED VOLUMES | 8,710 | 1,244 | 7,684 | 600 | 3,061 <u>72</u> | 3 7,3 | 5 | 1,202 | 8,508 | <u>511</u> 8,003 | 599 | 8,609 | 599 9,218 | 94 | 9,119 6 | 01 9,732 <u>2,112</u> | 2 7,625 | 584 8,61 | 5 665 | 8,871 <u>560</u> | 8,331 | 598 8,93 | 1 599 | 9,526 941 | 8,578 6 | 00 9,161 | 604 9 | ,763 <u>1,374</u> | 8,380 60 | 8,972 | 600 9,573 | <u>1.357</u> 8,2 | 225 586 | 8,813 5 | 99 8,855 | 2.271 7 | , 165 580 | 7,746 | 600 8,301 | 3.096 5,1 | 141 569 | 5,709 1,4 | 71 7,200 |
| AM PEAK (Served Vol.)- Mix-Flow Vol. AM PEAK | | | 6,342 1,342 | | i,413 | 5,70 | | | 6,849 1.659 | 6,323 1,680 | | 6,880 1,729 | 7,333 1.885 | | 7,251 1.868 | 7,967 1.765 | 6,082 | 6,72 1,88 | | 7,315 1,556 | 6,755 1,576 | 7,32 1,60 | | 7,913 1.613 | 7,062 1,516 | 7,613 1.548 | 8 | ,247 516 | 7,057 1,323 | 7,806 1,166 | 8,326 | -,- | | | | | | | | | | | |
| (Served Vol.)- HOV Vol. Avg. Speed. (MPH) - Mix-Flow | 57 | | 61 | | 60 | 60 | - | | 59 | 59 | | 50 | 58 | | 59 | 44 | 60 | 57 | • | 59 | 59 | 54 | | 57 | 57 | 47 | | 39 | 58 | 55 | 54 | .,- | 19 | 59 | 51 | | 59 | 56 | 39 | 5 | 55 | 59 | 60 |

BOTTLENECK
QUEUES & CONGESTION
HOV Lane

XXXX On-Ramp Volume

I-580 WESTBOUND



TRIANGLE TRAFFIC STUDY
I-580 Westbound
Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations
Year 2203 - AM Peak
ALTERNATIVE 2B

| | | G | ireenville l | Road | | | Vas | co Road | | | | First | Street | | | Livermore Avenue | | | Isabel Av | enue | | Airway | Boulevard | | | EI | Charro F | Road | 1 [| Sant | a Rita Ro | ad | 1 [| Hac | cienda D | rive | 7 [| | Hor | pyard Roa | 3d → | | | | I-680 | | |
|--|--------------|------|----------------|------------|----------------|------|-----|----------------|-----------------------|----------------|-----|----------------|------------------|----------|-----------------|---------------------|--------------------|---------|------------------|----------------|----------------|--------------|----------------|----------------|----------------|--------------|-----------|----------------|-----------------|----------------|---|--------------|----------------|----------------|----------|----------------|----------------|---------------|----------|----------------|--------------------|----------|--------------------|----------------------|----------|----------------------------|------------------|
| Ramp Meter | | OFF | <i>†</i> | ON | | OFF | • • | NB ON | SB ON | | OFF | • | NB ON | SB ON | OFF | , | ON | OFF | NB ON | | SB ON | OFF | NB ON | si oi | 3 N | OFF | NB ON | SB ON | ° | FF. | NB ON | SB ON | OI | FF . | NB ON | SB ON | | OFF | NB ON | Conne | nector Off | SB ON | 11 | -680 OFF | NB ON | SB ON | |
| YEAR 2030 ALT | ERNA | TIVE | 2B A | NALYS | is - A | M PE | EAK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ML+HOV+AUX RAMP PEER AM PEAK (Demand Vol.) | 4+0 9,362 | | 7.922 | 1+0 YES | 4+1+1 8,620 | 70.4 | | YES ',836 | 4+1+0 YES 1,587 | 4+1+: | 607 | 4+1+0 | 4+1+ /ES | YES | 4+1+0 | 4+1+0 Y | 4+1+0 ES 10 922 | 2416 0 | 4+1+0 YES | 4+1+0 | 4+1+ YES | +1 | 4+1+0 YES | 4+1+0 YE | 4+1+1 S | 4+1 | +0 YES | 4+1+0 YES | 4+1+1 | 4+1+0 | YES | I+1+1 YES | 4+1+1 | 4+1+6 | YES | 4+1+1 YES | 4+1+1 | 4+1+ 1 | YES | 4+1+1 | 4+0 | YES | 4+0+1 8,860 3,6 | 3+0+0 | NO | 4+0+0 NO 6,025 1,471 | 4+0+1 1 7,565 |
| (Demand Vol.) TOTAL SERVED VOLUMES | 8,740 | | | 600 | 8,040 | 712 | | ,327 | 1,202 | 8,511 | 543 | 7,950 | 599 8,550 | 599 | 9,136 <u>71</u> | 9,063 6 | 01 9,715 | 2,062 7 | 7,661 593 | 8,703 | 659 8,928 | 8 <u>614</u> | 8,313 598 | 8,896 59 | 9 9,496 | 1,082 8,42 | 4 600 | 9,036 604 | 9,635 <u>1.</u> | 79 8,336 | 601 8, | ,936 600 | 9,533 1,3 | 364 8,153 | 586 | 8,725 599 | 9,294 <u>1</u> | .102 8,044 | \$ 580 | 8,616 <u>1</u> | 1 <u>,156</u> 7,33 | | _ | 3,346 3,211 4,835 | | 5,479 1,529 | |
| AM PEAK (Served Vol.)- Mix-Flow Vol. AM PEAK (Served Vol.)- HOV Vol. | | | 6,308 1,366 | | 6,348 1,692 | | | i,711 i,616 | | 6,814 1,697 | | 6,230 1,720 | 6,781 1,769 | | 7,218 1,918 | 7,153 1,910 | 7,918 1,797 | | 5,084 1,577 | 6,777 1,926 | 7,377 1,551 | 7 | 6,748 1,565 | 7,298 1,598 | 7,892 1,604 | 6,91 1,50 | | 7,484 1,552 | 8,131 1,504 | 6,988 1,348 | • | ,767 ,169 | 8,308 1,225 | 6,900 1,253 | | 7,464 1,261 | 7,969 1,325 | 7,563 481 | | 8,415 201 | | | | | | | |
| Avg. Speed. (MPH) - Mix-Flow BOTTLENECK QUEUES & CONGESTION | 57 | | 61 | | 60 | | | 61 | | 59 | | 59 | 51 | | 58 | 59 | 43 | | 59 | 57 | 59 | | 59 | 53 | 58 | 57 | | 43 | 46 | 59 | | 56 | 54 | 59 | | 59 | 43 | 25 | | 36 | 34 | 1 | 46 | 58 | | 59 | 61 |
| HOV Lane Lane-1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

LEGEN Bottlen

XXXX Mainline Volume

XXXX On-Ramp Volume

XXXX Off- Ramp Volume

TRIANGLE TRAFFIC STUDY
I-580 Westbound
Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations
Year 2030 - AM Peak
ALTERNATIVE 3

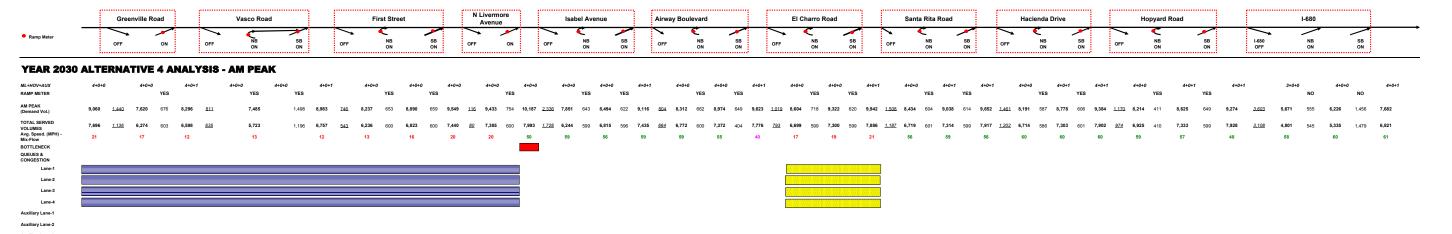
↓ N

| Ramp Meter | | Gree | nville Ro | ad ON | OFF | • | Vasco Ro | ad | SB ON | | OFF | First Str | reet | SB ON | N L OF | ivermore A | Avenue | OF | • | NB ON | JE SB ON | | Airway B | oulevard NB ON | _ | SB ON | OFF | El Charr | o Road | SB ON | OF | Santa | n Rita Road | SB ON | OF | • | ienda Dr | ive SB ON | | OFF | * | NB ON | Hopyard R | Road Connector C | Off | SB ON | | I-680 OFF | | I-680 NB ON | | SB ON | , |
|--|-------|-------|-----------|----------|-------------------------|------|----------|-------|----------|---------|-----------------|-----------|-------|----------|------------------|------------|--------|--------------------|---------|----------|-------------------|-------|----------------|----------------------|-------|-----------|----------------|-----------|--------|----------|--------------------|---------|-------------|-------|-------------------|-----------|----------|-----------------|--------|-------|-------|----------|-----------|------------------|-------|----------|-------|--------------|-------|-------------------|---------|-----------|--------------|
| YEAR 2030 ALTI | RNATI | VE 3 | ANA | LYSIS | - AM | PEAK | ζ | | | i | | | | | | | | · | | | | 1. | | | | ! | · | | | | ····· | | | | i | | | | ! | · | | | | | | <u></u> | | | | | | | |
| ML+HOV+AUX | 4+0+0 | | 4+1+0 | | 4+1+1 | 4+1+ | •0 | 4+1+0 | | 4+1+1 | 4 | 4+1+0 | 4+1+0 |) | 4+1+0 | 4+1+0 | | 4+1+0 | 4+1+0 | | 4+1+0 | 4+1+1 | 4+ | 1+0 | 4+1+0 | 4+1+ | +1 | 4+1+0 | 4+1+0 | , | 4+1+1 | 4+1+0 | 4+1 | 1+1 | 4+1+1 | 4+1+0 | | 4+1+1 | 4+1 | 1+1 | 4+ | 1+0 | 44 | +0+0 | 4+0 | J+1 | 4+0+1 | 1 | 3+0+6 | | 4+0+0 | | 4+0+1 |
| RAMP METER | | | | YES | | | YES | | YES | | | YES | | YES | | | YES | | | YES | YES | | | YES | ١ | ES | | YES | 3 | YES | | | YES | YES | | | YES | YES | | | | YES | | | | YES | | | | NO | | NO | |
| AM PEAK (Demand Vol.) | 9,370 | 1,440 | 7,930 | 699 8 | ,629 <u>784</u> | | 7,845 | | 1,594 | 9,439 5 | <u>i97</u> 8,8/ | 342 691 | 9,533 | 679 1 | 10,212 <u>12</u> | 6 10,086 | 756 1 | 10,842 <u>2,37</u> | 8,464 | 661 9 | 9, 125 666 | 9,791 | <u>606</u> 9,1 | 85 671 | 9,856 | 77 10,533 | 3 <u>1,033</u> | 9,500 668 | 10,168 | 662 | 10,830 <u>1,47</u> | 9,358 | 609 9,96 | 644 | 10,611 <u>1,5</u> | 9,085 | 591 | 9,676 642 | 10,318 | 1,549 | 9,170 | 589 | 9,759 | 1,549 | 8,210 | 651 | 8,861 | 3,512 | 5,349 | 677 | 6,026 1 | 1,539 7,5 | ,565 |
| TOTAL SERVED VOLUMES | 8,738 | 1,356 | 7,593 | 601 7 | , 978 <u>719</u> | | 7,270 | | 1,199 | 8,470 5 | 508 7,9° | 982 600 | 8,581 | 598 | 9,167 <u>79</u> | 9,099 | 601 | 9,690 <u>2,15</u> | 6 7,519 | 625 8 | 3,546 654 | 8,789 | 525 8,2 | 75 600 | 8,863 | 02 9,453 | 865 | 8,573 603 | 9,181 | 599 | 9,775 1,36 | 6 8,389 | 602 8,98 | 601 | 9,589 <u>1,4</u> | 120 8,156 | 589 | 8,698 600 | 9,134 | 1,323 | 8,048 | 588 | 8,644 | 1,323 | 7,331 | 598 | 7,925 | 3,084 | 4,835 | 648 | 5,479 1 | 1,491 6,9 | ,966 |
| AM PEAK (Served Vol.)- Mix-Flow Vol. | | | 6,302 | 6 | ,404 | | 5,784 | | | 6,873 | 6,3 | 357 | 6,911 | | 7,340 | 7,280 | | 7,975 | 6,023 | • | 3,707 | 7,285 | 6,7 | 57 | 7,315 | 7,898 | В | 7,098 | 7,672 | | 8,251 | 7,031 | 7,80 | 12 | 8,300 | 6,800 | | 7,322 | 7,629 | | 7,536 | | 8,425 | š | | | | | | | | | |
| AM PEAK (Served Vol.)- HOV Vol. | 0 | | 1,291 | 1 | ,574 | | 1,486 | | | 1,597 | 1,62 | 325 | 1,670 | | 1,827 | 1,819 | | 1,715 | 1,496 | 1 | 1,839 | 1,504 | 1,5 | 18 | 1,548 | 1,555 | 5 | 1,475 | 1,509 | | 1,524 | 1,358 | 1,17 | 78 | 1,289 | 1,356 | | 1,376 | 1,505 | | 512 | | 219 | | | | | | | | | | |
| Avg. Speed. (MPH) - Mix-Flow | 56 | | 61 | | 60 | | 61 | | | 59 | 58 | 8 | 49 | | 58 | 58 | | 43 | 58 | | 57 | 59 | 5 | 8 | 51 | 56 | | 45 | 39 | | 37 | 58 | 55 | | 55 | 52 | | 33 | 17 | | 24 | | 37 | | 35 | | 46 | | 59 | | 60 | 6 | 61 |
| BOTTLENECK QUEUES & CONGESTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HOV Lane | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

I-580 WESTBOUND

TRIANGLE TRAFFIC STUDY I-580 Westbound Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations Year 2030 - AM Peak ALTERNATIVE 4

1,



Bottleneck

Slow Moving Traffi

XXXX On-Ramp Volume

TRIANGLE TRAFFIC STUDY
I-580 Westbound
Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations
Year 2030 - AM Peak
ALTERNATIVE 5

T ,

| | | Gree | enville l | Road | | | Vasco | Road | | | | First S | treet | | | N Livern Avenu | | | Isabe | l Avenue | 9 | A | rway Bou | ulevard | | | E | Charro F | Road | | | Santa Rit | ita Road | | | Hacier | nda Drive | | | | Hopyard F | Road | | | | | I-680 | | | |
|--|-------|-------|----------------|------------|----------------|-----------------|-------|-------------------|--------------|----------------|-----|-------------------------|----------------------|------------|-------------------------|-------------------|-----------------|------------------------------|----------------|----------------|----------------|-------------------------|-------------------|-----------------|-------------------------|-------------------------|------------------|----------------------|----------------|--------------------------|-------|-------------------------|-------------------------|---------------------|----------------------------|------------------|--------------------------|--------------------|---------------------------|------|--------------------|----------------|----------------|----------------|--------------|----------------|-----------|----------------|---------------|----------------|
| Ramp Meter | | OFF | | ON | | OFF | ļ | NB ON | SB ON | | OFF | NI O | 3 | SB ON | ° | FF | ON | OFF | | NB ON | SB ON | ° | FF | NB ON | SE Of | B N | OFF | NB ON | _ | SB ON | OFF | NE Oh | B N | SB ON | OFF | . • | NB ON | SB ON | 0 |)FF | NB ON | | SB ON | | I-680 OFF | | NB ON | _ | SB ON | |
| YEAR 2030 ALTE | RNA | TIVE | 5 Al | NALY | SIS · | - AM PE | EAK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ML+HOV+AUX RAMP METER AM PEAK (Demand Vol.) | 4+0+i | | 4+1+ 7,826 | YES 688 | 4+1+ 8,514 | 1 <u>847</u> | | 4+1+ ES 667 | YES 1,550 | 4+1+1 9,217 | 618 | 4+1+0 YE 8,599 66 | 4+1- S 6 9,265 | YES 669 | 4+1+0 9,934 <u>1</u> | 4+1+ 20 9,814 | 0 YES 754 | 4+1+0 10,568 <u>2,650</u> | 4+1+0 7,918 | YES 616 8,5 | YES 534 637 | 4+0+1 9,171 <u>8</u> | 4+0+0 05 8,366 | 0 YES 662 | 4+0+0 YE 9,028 64 | 4+0+1 ES 41 9,669 | 4+6 1,098 8,5 | 7+0 YES 71 641 | 4+0+0 9,212 | 4+0+ YES 628 9,840 | 1,577 | 4+0+0 YE 8,263 60 | 4+0+1 ES 04 8,867 | 1 4 YES 618 9 | (+0+1 ,485 <u>1,473</u> | 4+0+0 8 8,012 | 4+0+ YES 587 8,599 | +1 YES 9 608 | 4+0+1 9,207 <u>1,1</u> | 4+0- | +0 YES 7 441 | 4+0+1 8,458 | YES 651 | 4+0+1 9,109 | <u>3,436</u> | 3+0+6 5,673 | NO 573 | 4+0+0 6,246 | NO 1,461 7 | 4+0+1 7,707 |
| TOTAL SERVED VOLUMES | 8,735 | 1,440 | 7,423 | 599 | 7,864 | 801 | 7, | 051 | 1,195 | 8,262 | 498 | 7,724 60 | 1 8,240 | 599 | 8,665 | <u>4</u> 8,423 | 599 | 8,883 <u>2,149</u> | 7,109 | 562 6,8 | 883 601 | 7,463 2 | <u>08</u> 6,658 | 599 | 7,147 60 | 00 7,631 | <u>854</u> 6,6 | 55 600 | 7,220 | 601 7,830 | 1.136 | 6,734 60 | 1 7,337 | 600 7 | ,945 1,260 | 6,710 | 587 7,298 | 8 600 | 7,907 9 | 6,92 | 3 440 | 7,367 | 598 | 7,972 | 2.842 | 5,133 | 556 | 5,686 | 1,460 7 | 7,217 |
| AM PEAK (Served Vol.)- Mix-Flow Vol. AM PEAK (Served Vol.)- HOV Vol. | 0 | | 6,228 1,195 | | 6,632 1,232 | | | 890 161 | | 6,983 1,279 | | 6,424 1,300 | 6,891 1,349 | | 7,163 1,502 | 6,921 1,502 | | 7,566 1,317 | 7,109 0 | 6,8 | B83 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Avg. Speed. (MPH) - Mix-Flow | 56 | | 61 | | 60 | | | 60 | | 59 | | 40 | 27 | | 20 | 16 | | 29 | 22 | 2 | 22 | 21 | 19 | | 21 | 19 | 17 | | 20 | 21 | | 55 | 57 | | 56 | 60 | 60 | | 60 | 59 | | 57 | | 48 | | 57 | | 59 | | 60 |
| BOTTLENECK QUEUES & CONGESTION HOV Lane | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-5 Auxiliary Lane-1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

LEGEN Bottlen

Lane-6 Auxiliary Lane-2 Lane-7 Auxiliary Lane-3

Slow Movine

XXXX On-Ramp Volume

I-580 WESTBOUND

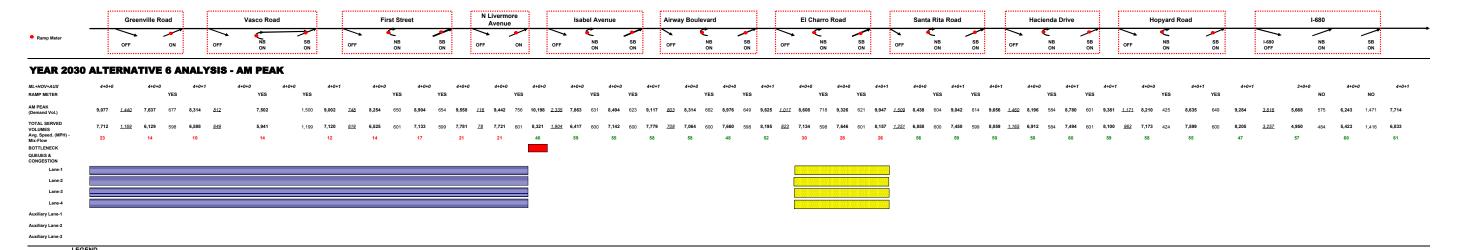
...

Queue

 XXXX
 On-Ramp Volume

 <u>XXXXX</u>
 Off- Ramp Volume

TRIANGLE TRAFFIC STUDY I-580 Westbound Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations Year 2030 - AM Peak ALTERNATIVE 6



TRIANGLE TRAFFIC STUDY
I-680 Southbound
Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations
Year 2030 - AM Peak
BASELINE ALTERNATIVE

I-680 SOUTHBOUND



YEAR 2030 FUTURE BASELINE ANALYSIS - AM PEAK ML+HOV+AUX 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 RAMP METER NO NO NO NO NO NO NO NO AM PEAK 857 5,879 4,577 2,891 5,260 1,223 1,766 481 7,822 2.921 4,901 <u>1,456</u> 3,445 1,132 7,468 2.076 5,392 416 5,808 248 6,056 1,093 4,963 5,820 6,483 485 5,998 119 7,645 8,126 (Demand Vol.) TOTAL SERVED VOLUMES 4,277 247 6,253 6,729 3,150 1,134 2,078 6,338 1.975 4,830 4,643 1,222 5,838 5,083 4,891 Avg. Speed. (MPH) - Mix-Flow 62 55 BOTTLENECK QUEUES & CONGESTION Lane-1

Lane-2

Lane-5 Auxiliary Lane-1

Lane-6 Auxiliary Lane-2

Lane-7 Auxiliary Lane-3

LEGEND Bottleneck

Queu

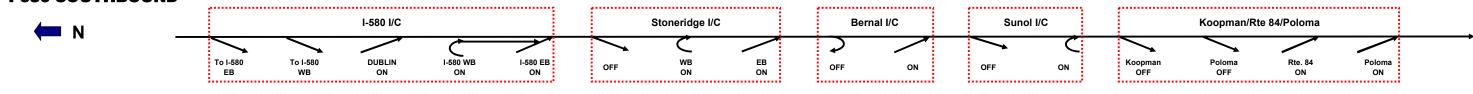
Slow Moving Traffic

XXXX Mainline Volume

XXXX On-Ramp Volume

TRIANGLE TRAFFIC STUDY
I-680 Southbound
Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations
Year 2030 - AM Peak
ALTERNATIVE 1

I-680 SOUTHBOUND



YEAR 2030 ALTERNATIVE 1 ANALYSIS - AM PEAK ML+HOV+AUX 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 RAMP METER NO NO NO NO NO NO NO NO NO AM PEAK 4,637 5,719 259 923 1,225 5,759 1,954 7,713 505 7,825 2,913 4,912 1.461 3,451 1,186 2,699 7,336 2,060 5,276 443 5,978 1,109 4,869 5,792 601 5,191 6,416 528 5,888 129 8,218 (Demand Vol.) TOTAL SERVED VOLUMES 259 922 5,297 4,521 4,806 1,811 6,663 505 7,168 1.425 3,558 1,186 4,744 1,939 6,537 1.893 443 5,155 4,453 1,225 4,874 Avg. Speed. (MPH) - Mix-Flow 16 56 BOTTLENECK QUEUES & CONGESTION Lane-1

Lane-2
Lane-3
Lane-4
Lane-5 Auxiliary Lane-1

LEGEND
Bottleneck
Queue
Slow Moving Traffic

Lane-6 Auxiliary Lane-2
Lane-7 Auxiliary Lane-3

XXXX Mainline Volume

XXXX On-Ramp Volume

TRIANGLE TRAFFIC STUDY I-680 Southbound Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations Year 2030 - AM Peak **ALTERNATIVE 2A**

I-680 SOUTHBOUND



YEAR 2030 ALTERNATIVE 2A ANALYSIS - AM PEAK ML+HOV+AUX 3+0+0 3+0+1 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 RAMP METER NO NO AM PEAK (Demand Vol.) 527 7,785 <u>2.933</u> 4,851 <u>1,471</u> 3,380 913 4,294 2,480 6,774 <u>2,542</u> 4,232 1.269 5.501 385 5.887 253 6,140 <u>1,101</u> 5.040 838 5,878 <u>428</u> 5,449 1,119 6,568 487 6.081 119 5,962 1,678 7,640 8,167 TOTAL SERVED VOLUMES 1,467 527 6,033 7,195 2.495 4,572 1,489 4,021 2,054 5,957 2,270 3,594 4,691 5,053 254 4,818 823 3,971 254 3,464 4,433 339 4,120 65 4,034 5,503 3,093 3,486 Avg. Speed. (MPH) - Mix-Flow 62 53 16 55 BOTTLENECK

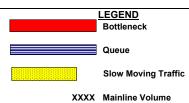
QUEUES & CONGESTION

Lane-1 Lane-2 Lane-3 Lane-4

Lane-5 Auxiliary Lane-1

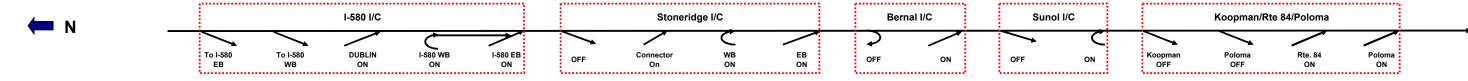
Lane-6 Auxiliary Lane-2

Lane-7 Auxiliary Lane-3



XXXX On-Ramp Volume XXXX Off- Ramp Volume

I-680 SOUTHBOUND



YEAR 2030 ALTERNATIVE 2B ANALYSIS - AM PEAK ML+HOV+AUX 3+0+0 3+0+1 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 RAMP METER NO NO NO AM PEAK (Demand Vol.) 527 **8,167** 7,785 <u>2.933</u> 4,851 <u>1.471</u> 3,380 913 4,294 2,480 6,774 <u>2.542</u> **4,232** 1.269 5,501 385 5.887 253 **6,140** <u>1,101</u> 5,040 838 5,878 <u>428</u> 5,449 1,119 6.568 487 6.081 119 5,962 1,678 7,640 TOTAL SERVED VOLUMES 553 <u>370</u> 5,508 527 7,246 2,520 4,665 1.533 4,050 2,037 6,063 2,213 3,594 4,853 5,120 4,745 3,446 3,895 246 3,501 4,490 81 4,071 1,436 6,033 3,137 Avg. Speed. (MPH) - Mix-Flow 17 54 BOTTLENECK QUEUES & CONGESTION Lane-1 Lane-2 Lane-3 Lane-4

LEGEND
Bottleneck

Queue

Slow Moving Traffic

XXXX Mainline Volume

XXXX On-Ramp Volume

XXXX Off- Ramp Volume

Lane-5 Auxiliary Lane-1
Lane-6 Auxiliary Lane-2
Lane-7 Auxiliary Lane-3

TRIANGLE TRAFFIC STUDY I-680 Southbound Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations Year 2030 - AM Peak ALTERNATIVE 3

I-680 SOUTHBOUND

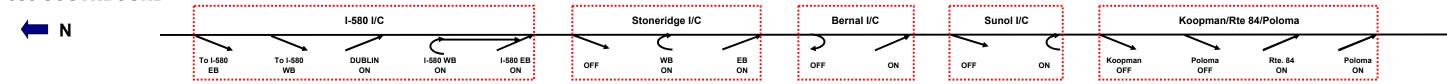
| | | | | | | I-580 I/C | | | | | | | Stoneri | idge [/C | | | | | 3ernal I/0 | | | | Sunol I/C | | | | K | oopmar | n/Rte 84 | /Poloma | 1 | | |
|---------------------------------|----------------------|----------------|-------|----------------|-------|--------------------|-------|----------------|----------------|-------|--------------|-------|-------------|----------|-------|----------|-------|--------------|------------|-----|-------|------------|-----------|-------|-------|----------------|-------|---------------|----------|--------------------|-------|--------------|-------|
| N | | To I-580 EB | | To I-580 WB | | DUBLIN ON | | I-580 WB ON | I-580 EB ON | | OFF | | I-580 ON | WB ON | | EB ON | | OFF | | ON | | OFF | | ON | | Koopman OFF | | Poloma OFF | | Rte. 84 ON | | Poloma ON | |
| AR 2030 ALTERNA OV+AUX METER | ATIVE 3 4+1+2 | | LYSI3 | | 3+1+0 |) | 3+1+0 | | NO | 3+1+ | 1 | 3+1+0 | | NO | 3+1+0 | NO | 3+1+0 | | 3+1+0 | NO | 3+1+0 |) | 3+1+0 | NO | 3+1+0 | | 3+1+0 | | 3+1+0 | | 3+1+0 | 3+1+0 NO | |
| EAK and Vol.) | 8,439 | 2,893 | 5,546 | <u>1,539</u> | 4,007 | NO 1,233 | 5,240 | NO | 2,586 | 7,826 | <u>2,452</u> | 5,374 | 1,549 | 462 | 7,385 | 309 | 7,694 | <u>1,237</u> | 6,457 | 785 | 7,242 | <u>491</u> | 6,751 | 1,179 | 7,930 | <u>574</u> | 7,356 | <u>127</u> | 7,229 | NO 1,643 | 8,872 | 300 | 9,172 |
| AL SERVED VOLUMES | 7,866 | 2,549 | 5,315 | 1,489 | 3,828 | 1,232 | 5,060 | | 2,068 | 7,135 | 2,247 | 4,142 | 1,318 | 462 | 6,015 | 308 | 6,922 | 944 | 5,828 | 786 | 6,368 | <u>452</u> | 5,834 | 917 | 6,778 | <u>451</u> | 6,104 | <u>71</u> | 6,042 | 1,427 | 7,484 | 300 | 7,784 |
| EAK ed Vol.)- Mix-Flow Vol. | 6,331 | | 4,144 | | 2,923 | | 4,133 | | | 6,211 | | 3,226 | | | 4,648 | | 5,213 | | 4,163 | | 4,629 | | 4,243 | | 5,227 | | 4,555 | | 4,501 | | 5,754 | | 6,077 |
| AK d Vol.)- HOV Vol. | 1,535 | | 1,171 | | 905 | | 927 | | | 924 | | 916 | | | 1,367 | | 1,709 | | 1,665 | | 1,739 | | 1,591 | | 1,551 | | 1,549 | | 1,541 | | 1,730 | | 1,707 |
| Speed. (MPH) - Mix-Flow | 10 | | 52 | | 62 | | 59 | | | 58 | | 60 | | | 51 | | 56 | | 32 | | 16 | | 11 | | 19 | | 11 | | 12 | | 18 | | 34 |
| LENECK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ES & CONGESTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-5 Auxiliary Lane-1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-6 Auxiliary Lane-2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-7 Auxiliary Lane-3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

LEGEND Bottleneck Slow Moving Traffic

XXXX Mainline Volume XXXX On-Ramp Volume

TRIANGLE TRAFFIC STUDY
I-680 Southbound
Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations
Year 2030 - AM Peak
ALTERNATIVE 4

I-680 SOUTHBOUND



| //L+HOV+AUX | 4+0+2 | 4+0 | +1 | 3+0+0 | | 3+0+0 | | | 3+0+1 | | 3+0+0 | | 3+0+0 | | 3+0+0 | | 3+0+0 | | 3+0+0 | | 3+0+0 | | 3+0+0 | | 3+0+0 | | 3+0+0 | | 3+0+0 | 3+0+0 | o |
|----------------------------|---------------------------|-------|--------------|-------|-------|-------|----|-------|-------|--------------|-------|-----|-------|-----|-------|--------------|-------|-----|-------|------------|-------|-------|-------|------------|-------|------------|-------|-------|-------|-------|-----|
| AMP METER | | | | | NO | | NO | NO | | | | NO | | NO | | | | NO | | | | NO | | | | | | NO | | NO | |
| M PEAK Demand Vol.) | 7,822 <u>2,921</u> | 4,90 | <u>1,456</u> | 3,445 | 1,132 | 4,577 | | 2,891 | 7,468 | <u>2,076</u> | 5,392 | 416 | 5,808 | 248 | 6,056 | <u>1.093</u> | 4,963 | 857 | 5,820 | <u>560</u> | 5,260 | 1,223 | 6,483 | <u>485</u> | 5,998 | <u>119</u> | 5,879 | 1,767 | 7,646 | 482 | 8,1 |
| TAL SERVED VOLUMES | 7,200 <u>2.478</u> | 4,649 | <u>1,452</u> | 3,183 | 1,132 | 4,344 | | 2,012 | 6,301 | <u>1,942</u> | 4,448 | 416 | 4,860 | 248 | 5,080 | <u>914</u> | 4,165 | 858 | 5,020 | <u>512</u> | 4,489 | 1,222 | 5,649 | <u>438</u> | 4,889 | <u>73</u> | 4,712 | 1,398 | 6,326 | 481 | 6,8 |
| g. Speed. (MPH) - Mix-Flow | 13 | 53 | | 62 | | 50 | | | 35 | | 52 | | 52 | | 57 | | 60 | | 59 | | 60 | | 47 | | 17 | | 12 | | 18 | | 5 |
| TTLENECK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UEUES & CONGESTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Lane-2
Lane-3
Lane-4
Lane-5 Auxiliary Lane-1

Lane-6 Auxiliary Lane-2
Lane-7 Auxiliary Lane-3

LEGEND Bottleneck

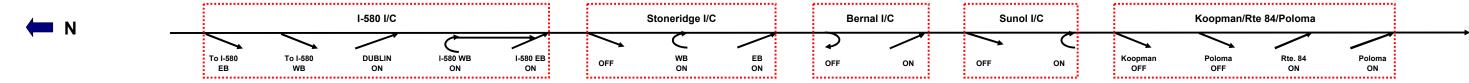
Queue

Slow Moving Traffic

XXXX Mainline Volume

XXXX On-Ramp Volume

I-680 SOUTHBOUND



| ML+HOV+AUX | 4+0+2 | ? | 4+0+1 | | 3+0+0 | | 3+0+0 | | | 3+0+1 | | 3+0+0 | | 3+0+0 | | 3+0+0 | | 3+0+0 | | 3+0+0 | | 3+0+0 | | 3+0+0 | | 3+0+0 | | 3+0+0 | | 3+0+0 | 3+0+ | 0 |
|------------------------------|-------|--------------|-------|--------------|-------|-------|-------|----|-------|-------|--------------|-------|-----|-------|-----|-------|--------------|-------|-----|-------|------------|-------|-------|-------|------------|-------|------------|-------|-------|-------|------|------|
| RAMP METER | | | | | | NO | | NO | NO | | | | NO | | NO | | | | NO | | | | NO | | | | | | NO | | NO | |
| AM PEAK Demand Vol.) | 7,816 | <u>2,903</u> | 4,913 | <u>1,461</u> | 3,452 | 1,184 | 4,636 | | 2,711 | 7,347 | 2.062 | 5,285 | 443 | 5,728 | 258 | 5,986 | <u>1.115</u> | 4,871 | 937 | 5,808 | <u>599</u> | 5,209 | 1,225 | 6,434 | <u>528</u> | 5,906 | <u>145</u> | 5,761 | 1,977 | 7,738 | 476 | 8,21 |
| TOTAL SERVED VOLUMES | 7,576 | <u>2,589</u> | 4,878 | <u>1,452</u> | 3,331 | 1,184 | 4,523 | | 2,017 | 6,461 | <u>1.873</u> | 4,661 | 443 | 5,100 | 257 | 5,371 | <u>985</u> | 4,403 | 937 | 5,182 | <u>518</u> | 4,368 | 1,221 | 5,250 | <u>418</u> | 4,603 | <u>72</u> | 4,526 | 1,791 | 6,317 | 476 | 6,79 |
| Avg. Speed. (MPH) - Mix-Flow | 15 | | 56 | | 61 | | 32 | | | 29 | | 53 | | 51 | | 57 | | 60 | | 38 | | 17 | | 16 | | 10 | | 10 | | 15 | | 57 |
| BOTTLENECK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QUEUES & CONGESTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lane-1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Lane-2
Lane-3
Lane-4
Lane-5 Auxiliary Lane-1
Lane-6 Auxiliary Lane-2

LEGEND
Bottleneck
Queue
Slow Moving Traffic

Lane-7 Auxiliary Lane-3

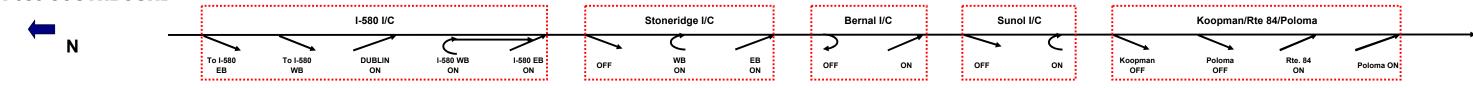
XXXX Mainline Volume

XXXX On-Ramp Volume

XXXX Off- Ramp Volume

TRIANGLE TRAFFIC STUDY
I-680 Southbound
Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations
Year 2030 - AM Peak
ALTERNATIVE 6

I-680 SOUTHBOUND



YEAR 2030 ALTERNATIVE 6 ANALYSIS - AM PEAK ML+HOV+AUX 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 3+0+0 RAMP METER NO NO NO NO NO NO NO NO AM PEAK 250 861 5,243 1,769 7,627 516 7,787 2.926 4,861 <u>1,471</u> 3,390 1,158 4,548 2,898 7,446 2.082 5,364 416 5,780 6,030 1,089 4,941 5,802 1,225 6,468 485 5,983 <u>125</u> 5,858 8,143 (Demand Vol.) TOTAL SERVED VOLUMES 4,367 4,583 5,001 1,400 6,367 6,879 4,621 1,424 3,199 1,159 2,066 6,422 1.945 4,937 250 5,187 1,225 5,189 Avg. Speed. (MPH) - Mix-Flow 62 47 17 55 BOTTLENECK QUEUES & CONGESTION

Lane-1 Lane-2

> Lane-3 Lane-4

Lane-5 Auxiliary Lane-1

Lane-6 Auxiliary Lane-2

Lane-7 Auxiliary Lane-3

LEGEND Bottleneck

Queue

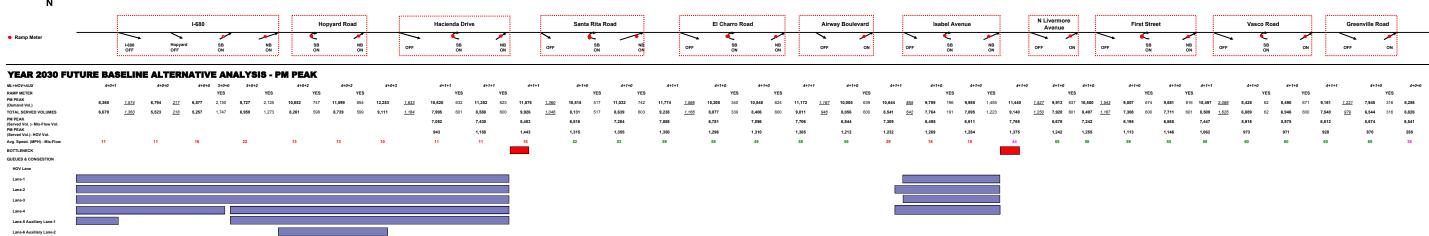
Slow Moving Traffic

XXXX Mainline Volume

XXXX On-Ramp Volume

Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations Year 2030 - PM Peak BASELINE ALTERNATIVE





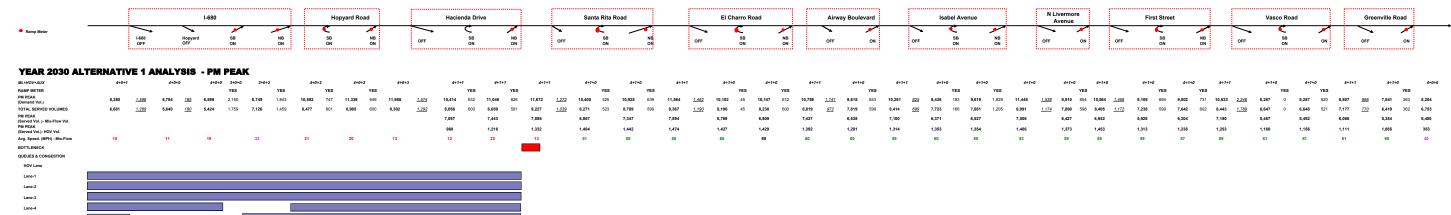
Bottleneck
Queue
XXXX Mainline Volume
XXXX On-Ramp Volume

I-580 EASTBOUND

TRIANGLE TRAFFIC STUDY
1-580 Eastbound
Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations
Year 2030 - PM Peak
ALTERNATIVE 1



Lane-5 Auxiliary Lane-1

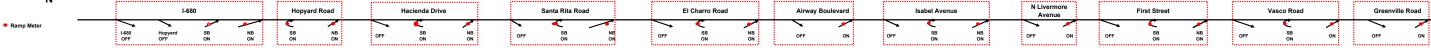




I-580 EASTBOUND



Lane-2 Lane-3 Lane-4 Lane-5 Auxiliary Lane-1 Lane-6 Auxiliary Lane-2









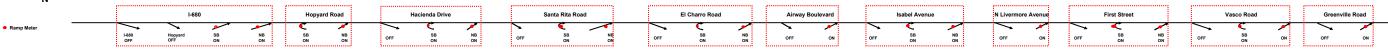
Page 3 of 8

RESULTS WOULD BE SIMILAR TO ALT #2A

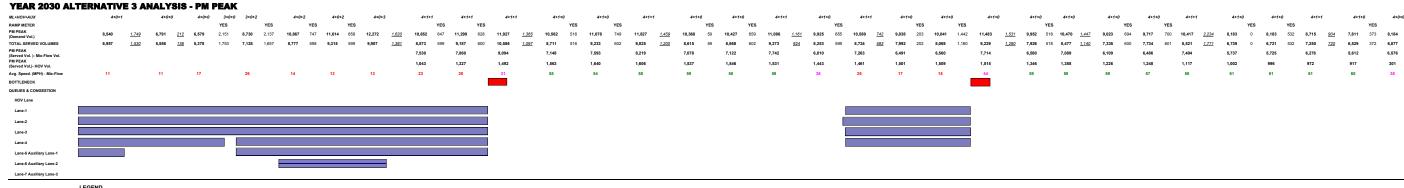
TRIANGLE TRAFFIC STUDY
I-580 Eastbound
Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations
Year 2030 - PM Peak
ALTERNATIVE 3

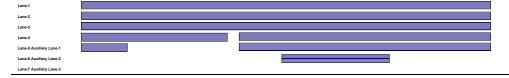


I-580 EASTBOUND



YEAR 2030 ALTERNATIVE 3 ANALYSIS - PM PEAK





Bottleneck
Queue
XXXX Mainline Volume
XXXX On-Ramp Volume



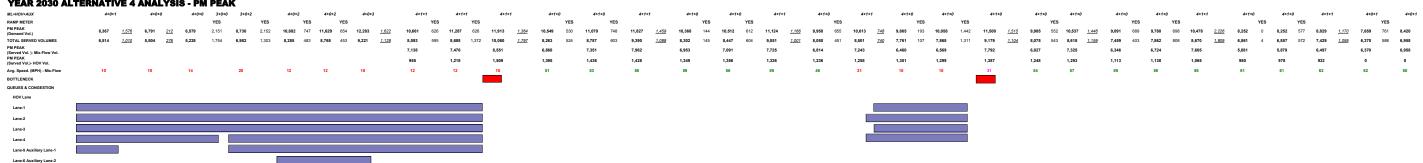
TRIANGLE TRAFFIC STUDY
1-580 Eastbound
Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations
Year 2030 - PM Peak
ALTERNATIVE 4



I-580 EASTBOUND







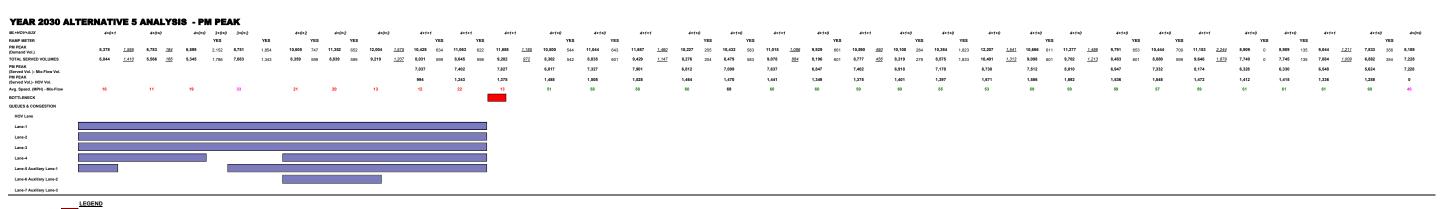


TRIANGLE TRAFFIC S
1-580 EASTBOUND



TRIANGLE TRAFFIC STUDY I-580 Eastbound Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations Year 2030 - PM Peak ALTERNATIVE 5



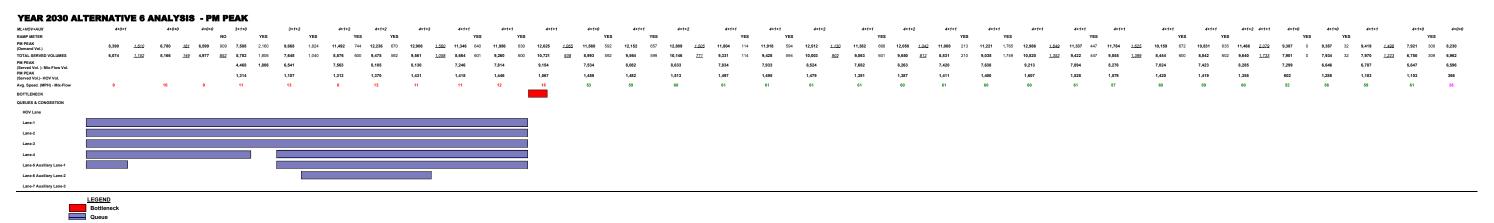


Bottleneck
Queue
XXXX Mainline Volume
XXXX On-Ramp Volume
XXXX Off-Ramp Volume

TRIANGLE TRAFFIC STUDY
1-580 Eastbound
Mainline Volumes, Lane Geometry, Bottleneck and Queue Locations
Year 2030 - PM Peak
ALTERNATIVE 6

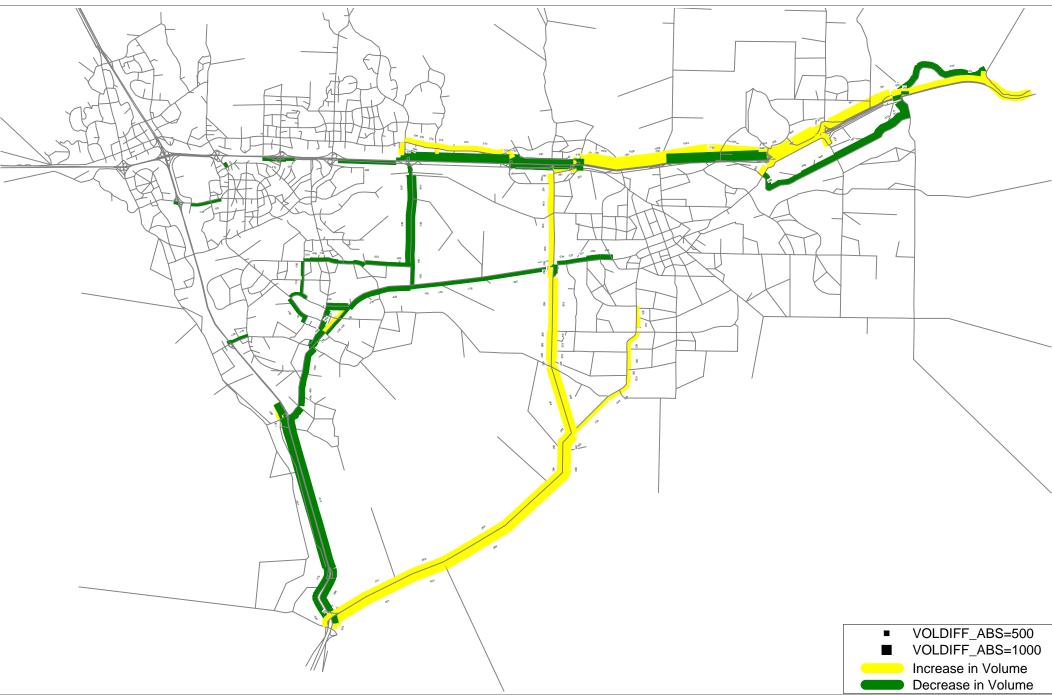
I-580 EASTBOUND





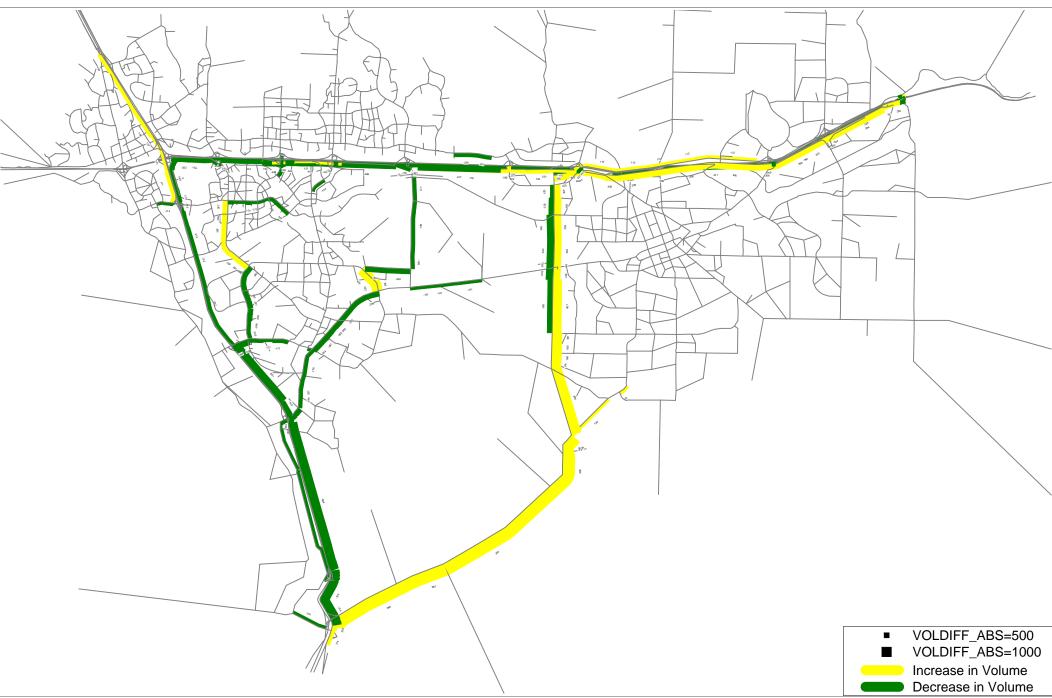
XXXX Mainline Volume XXXX On-Ramp Volume XXXX Off- Ramp Volume

ACCMA Triangle Study Alt. 1 vs. Future Base AM Peak Hour



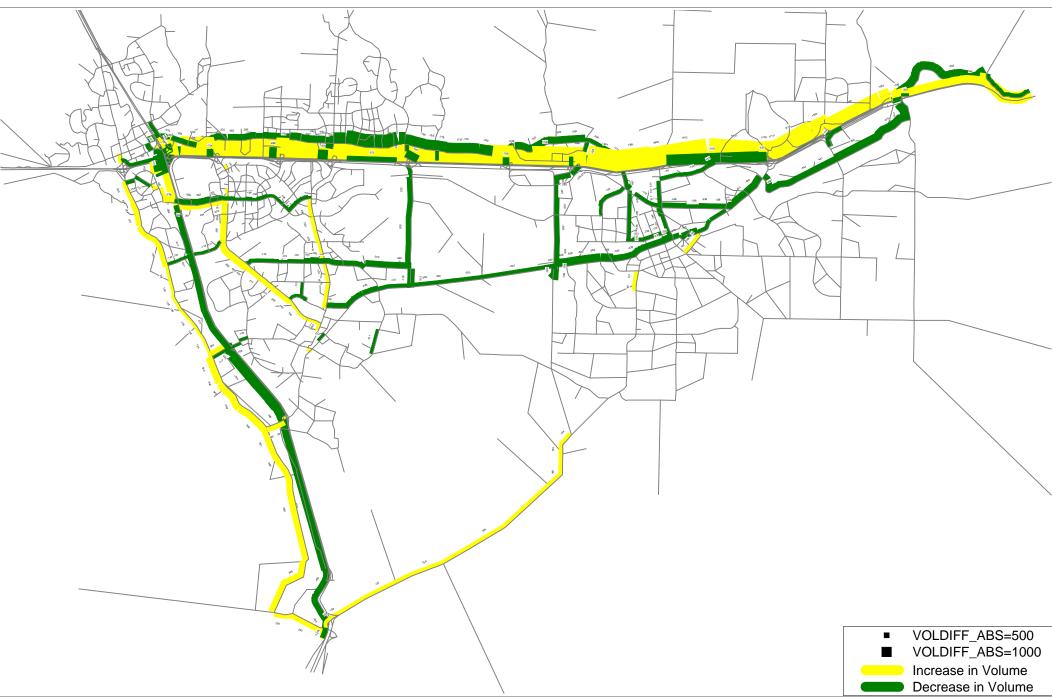


ACCMA Triangle Study Alt. 1 vs. Future Base PM Peak Hour



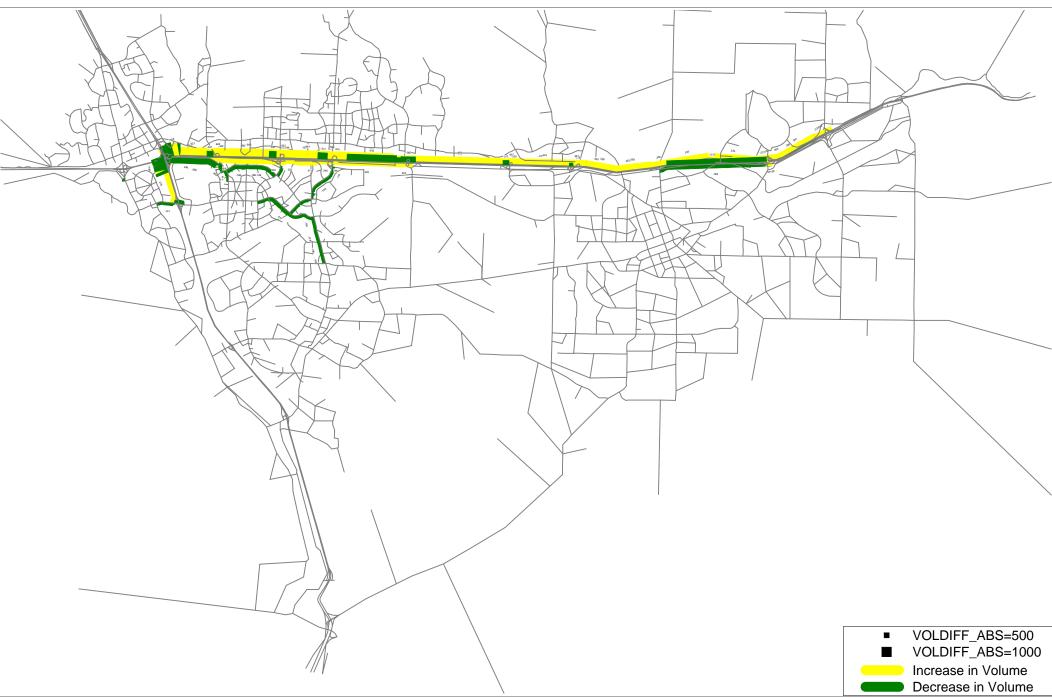


ACCMA Triangle Study Alt. 2a vs. Future Base AM Peak Hour



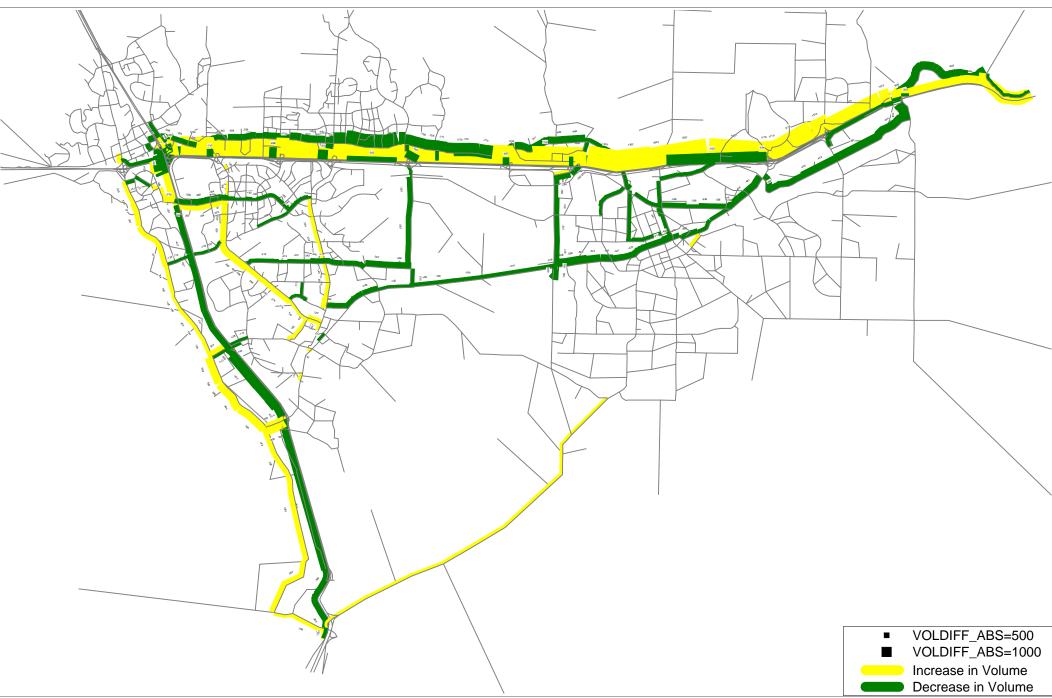


ACCMA Triangle Study Alt. 2a vs. Future Base PM Peak Hour



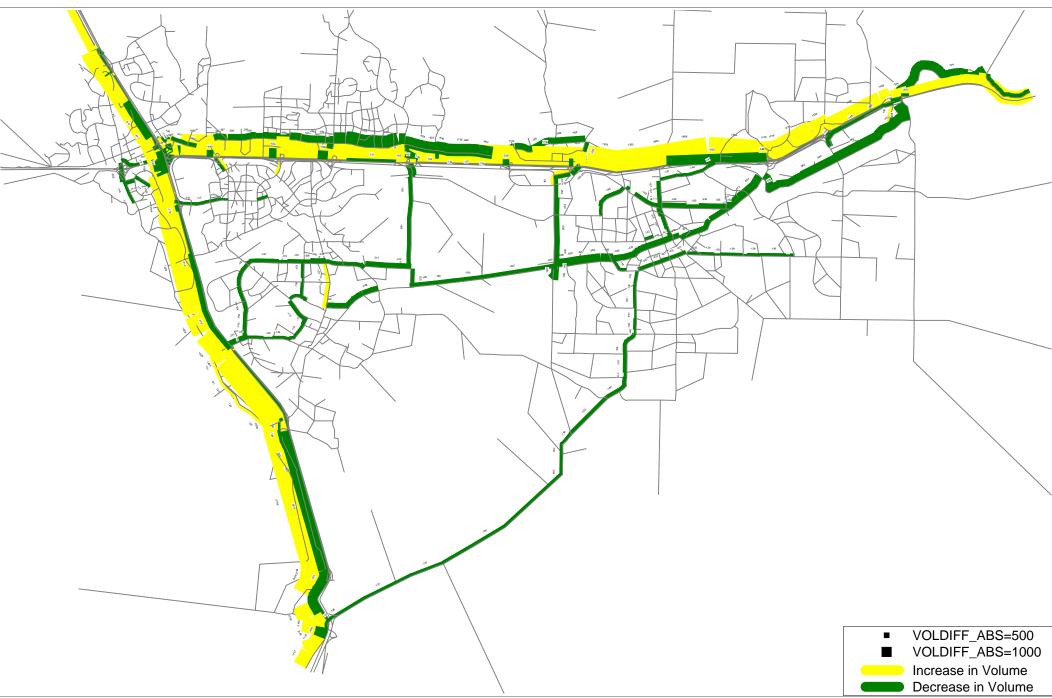


ACCMA Triangle Study Alt. 2b vs. Future Base AM Peak Hour



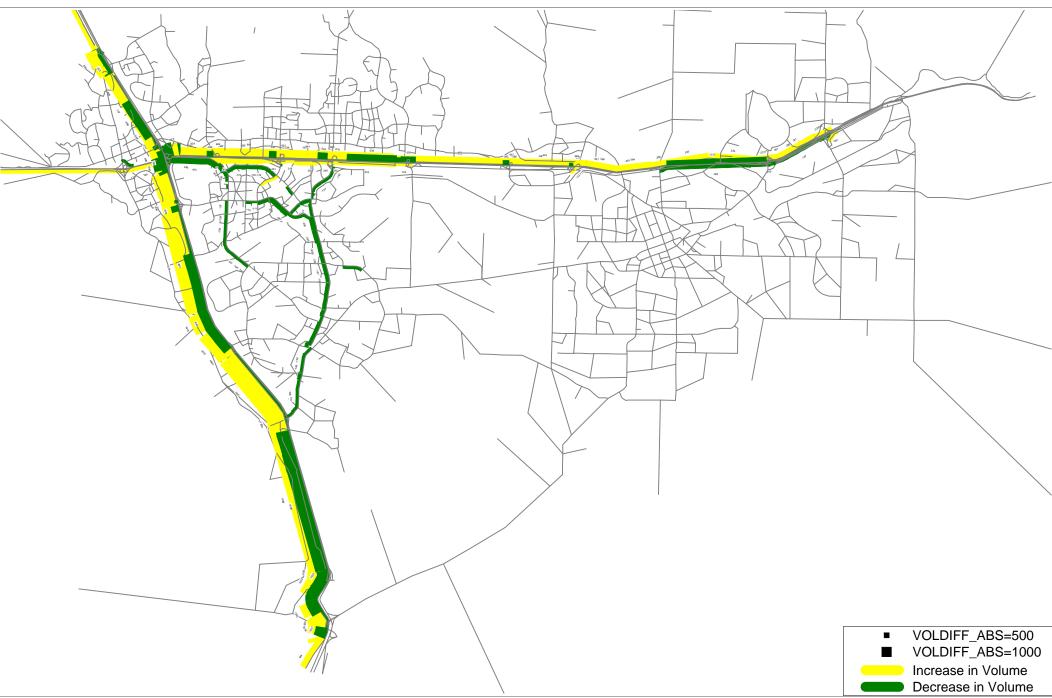


ACCMA Triangle Study Alt. 3 vs. Future Base AM Peak Hour



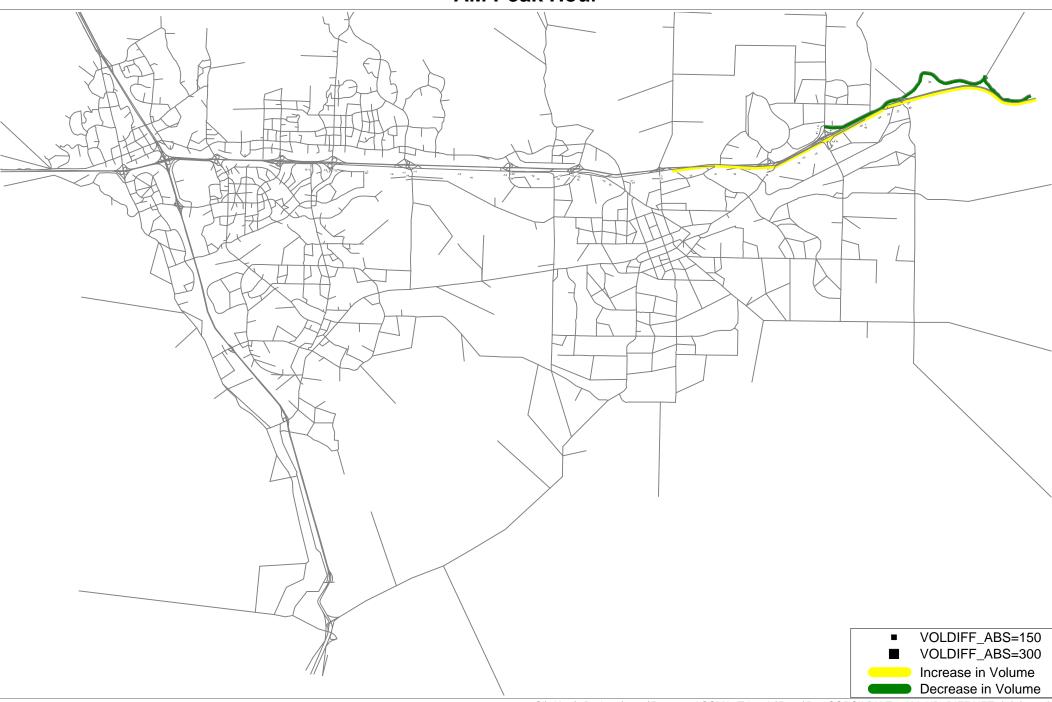


ACCMA Triangle Study Alt. 3 vs. Future Base PM Peak Hour





ACCMA Triangle Study Alt. 4 vs. Future Base AM Peak Hour



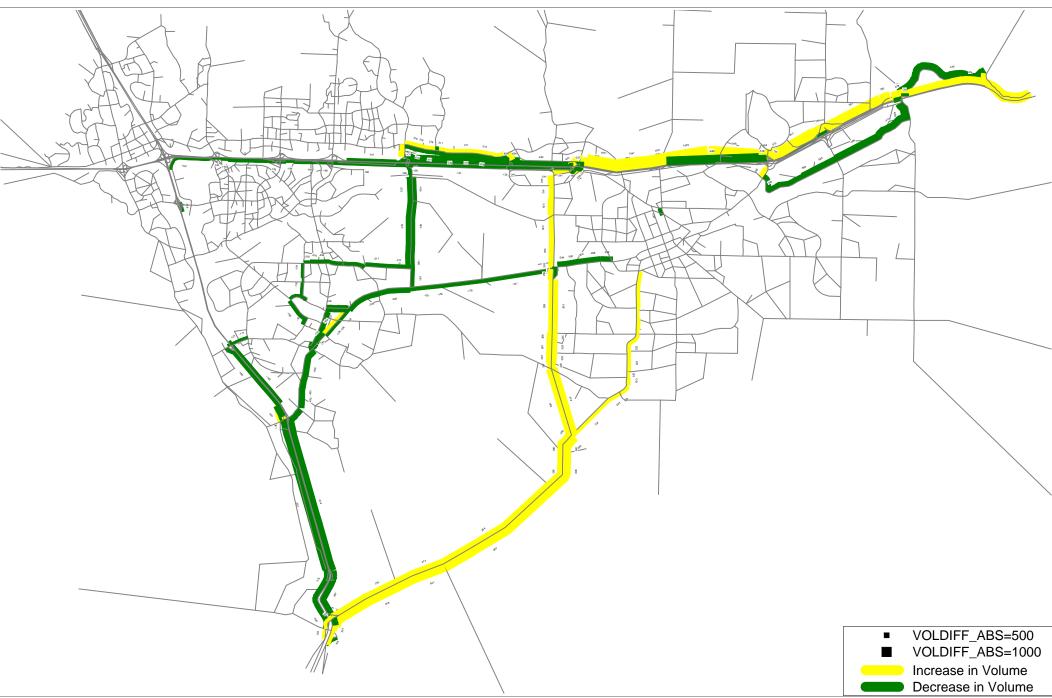


ACCMA Triangle Study Alt. 4 vs. Future Base PM Peak Hour



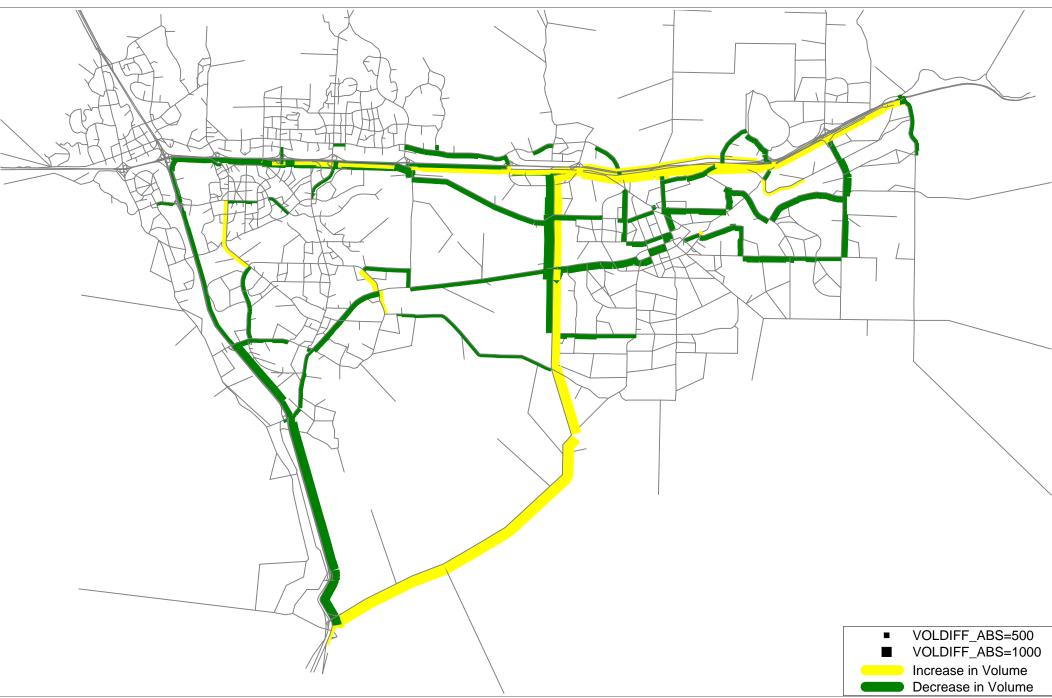


ACCMA Triangle Study Alt. 5 vs. Future Base AM Peak Hour



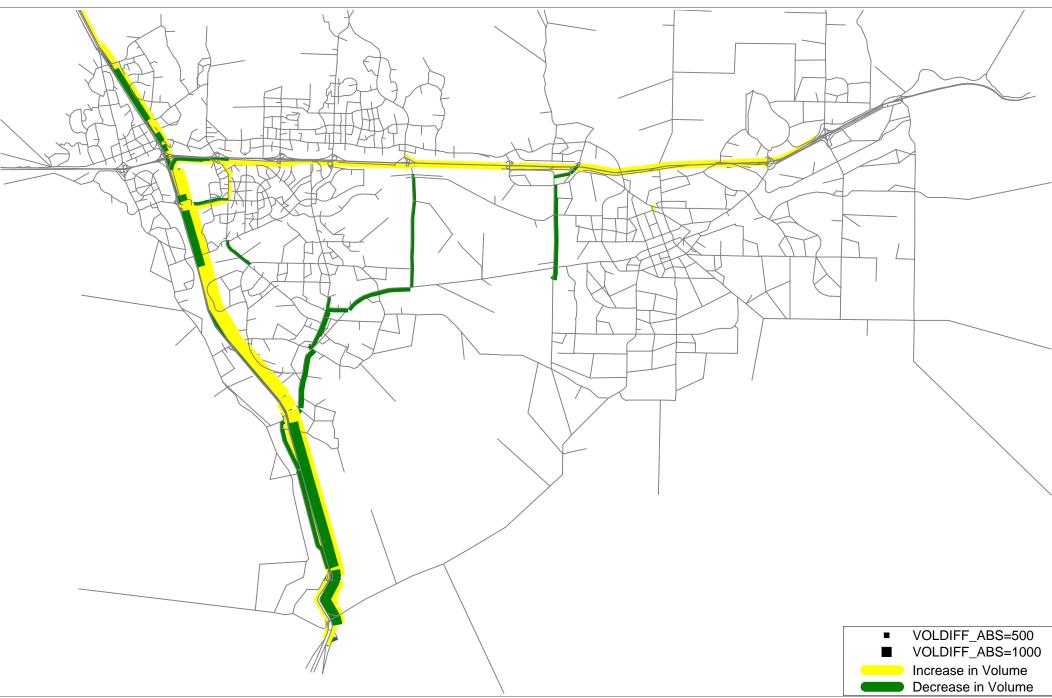


ACCMA Triangle Study Alt. 5 vs. Future Base PM Peak Hour



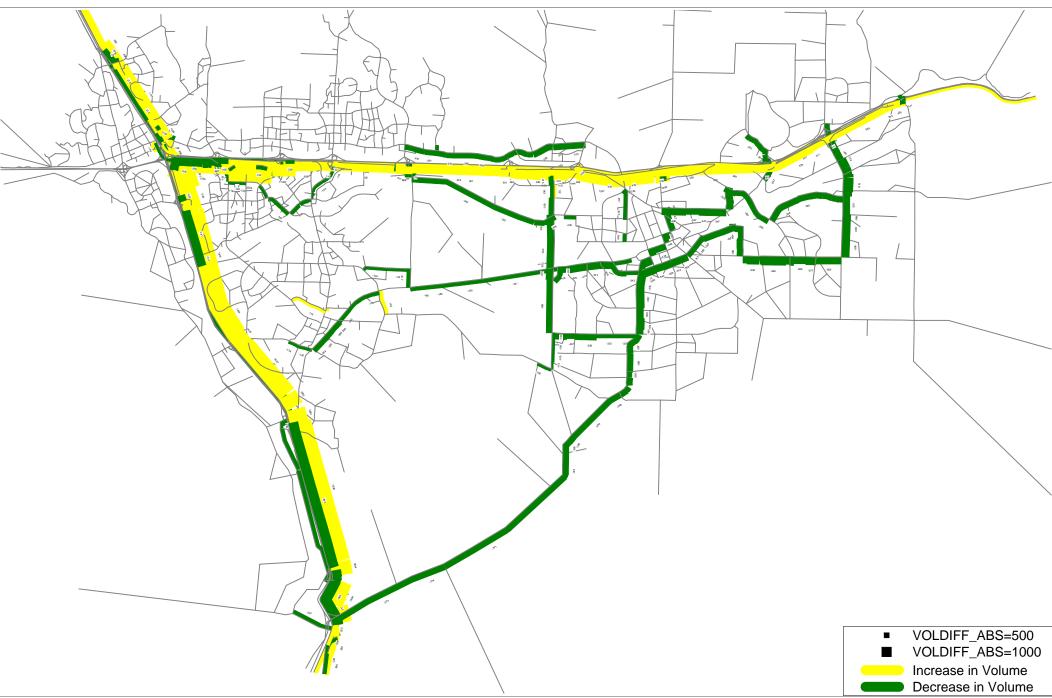


ACCMA Triangle Study Alt. 6 vs. Future Base AM Peak Hour





ACCMA Triangle Study Alt. 6 vs. Future Base PM Peak Hour







120 Howard Street, Suite 850 • San Francisco, California 94105 • (415) 227-6600 • Fax: (415) 546-1602 • www.parsons.com

Memorandum

TO: Tri-Valley Triangle Study Policy Advisory Committee

FROM: Parsons

DATE: June 1, 2006

SUBJECT: Tri-Valley Triangle Study – Qualitative Measures

Overview

The purpose of this memo is to:

- Present the current qualitative data on alternatives to the Policy Advisory Committee (PAC);
- Obtain input on potential political or environmental obstacles to alternatives for rating under Political obstacles could include any regional policies that may prevent the project from moving forward.

Executive Summary of Qualitative Measures

As previously reviewed by the PAC, the selected approach is to rate the qualitative measures using a point system, and develop an overall score. The four qualitative measures, which would have a total of 30 percent of the evaluation weight (or 30 points), are the following:

- Severity and location of bottlenecks and traffic queues in the corridor (maximum 5 points)
- Project readiness—PAC input needed (maximum 10 points)
- Compatibility with other planned improvements (maximum 10 points)
- Connectivity and access (maximum 5 points)

The matrix, Table 1, summarizes the data for the qualitative measures and component items of each measure. Following completion of the hybrid alternative, the data will be scored according to the procedures listed below.

Summary of Qualitative Rating Approach

The following paragraphs discuss how each qualitative measure would be implemented. Additional footnotes will be added, as appropriate, to explain yes and no answers, in the final documentation of the ratings.



Severity and Location of Bottlenecks and Traffic Queues in the Corridors

The Team evaluated each alternative based on reduction of traffic queuing on the regional system (I-580, I-680 and Route 84) within each jurisdiction, as shown on Alternative Description and Operations Summary graphics in the PAC package. These graphics show the approximate location and length of queues, including Route 84 queues. These are based on reviewing the queue length and location information from CORSIM, including the more qualitative queuing information on Route 84.

A comparison of alternatives with the Future Base Alternative was done to assess if there are changes in the queue lengths and locations. If an alternative results in reducing traffic queue length or moving any queues to a more favorable location as compared to the Future Base Alternative, it was be considered an improvement and would get a "+1" score in the rating. However, if there is no change it would get "0" score and a "-1" score if the alternative results in longer queue lengths or less favorable locations.

The five factors under "Location of Bottlenecks and Queues" in Table 1, as they relate to the regional system, will be rated as follows:

- Does the overall number of bottlenecks and length of queues increase, stay the same, or decrease (the scoring would be -1, 0 or +1, respectively)? These assessments presented in Table 1 are approximate combinations of the quantitative queuing information from I-580 and I-680 and the more qualitative queuing information from Route 84. The Route 84 queuing information will be roughly quantified prior to the draft report to give a more quantitative basis for the overall queuing rating.
- How does the alternative change queuing on the regional system within the jurisdiction of Alameda County increase length or move to a less favorable location, stay the same, or decrease queue lengths or move to a more favorable location? (The scoring would be -1, 0 or +1, respectively)? For example, queuing on state routes within Alameda County can occur on I-580 over the Altamont Pass, on I-680 south of Sunol Boulevard, and on Vallecitos Road between Pigeon Pass and I-680. I-580 and I-680 queue locations tend to be of more concern to the County because of resulting diversion to other County roads.
- How does the alternative change queuing on the regional system in Dublin increase length or move to a less favorable location, stay the same, or decrease queue lengths or move to a more favorable location? (The scoring would be -1, 0 or +1, respectively)?
- How does the alternative change queuing on the regional system in Pleasanton increase length or move to a less favorable location, stay the same, or decrease queue lengths or move to a more favorable location? (The scoring would be -1, 0 or +1, respectively)?
- How does the alternative change queuing on the regional system in Livermore increase length or move to a less favorable location, stay the same, or decrease queue lengths or move to a more favorable location? (The scoring would be -1, 0 or +1, respectively)?

Project Readiness

The factors to be considered are the following:

- The existence/progress of environmental studies for the project.
- Potential obstacles for project This factor rates the project alternatives depending on the presence of political or environmental obstacles in delivering the project. Political obstacles could

PARSONS Page 2

Triangle PAC June 1, 2006

include any regional policies that may prevent the project from moving forward. This item is left open for input from the PAC.

- Existence/progress of Project Study report (PSR) Denotes the presence of a PSR for the proposed project.
- Funding available for the project.

For each of the first three factors mentioned above, the questions are answered with a "yes" or "no," with "yes" being the positive answer. The second factor rates the project alternatives potential for having political or environmental obstacles. An example of political obstacle would be public opposition to the alternative which potential would delay the construction of the alternative. An example of an environmental obstacle would be difficulty and time consuming environmental impact mitigation requirements that will delay the delivery of the alternative. The assessment for this factor is left open for the PAC to give input as part of their review and acceptance of the overall scoring results. The scoring process anticipates that the PAC would vote on the question, "Is the project free from potential obstacles that could impede its delivery?" and assign each alternative from 0 (not politically/environmentally feasible) to 2.5 (no obstacles) points.

Since each alternative package consists of one or more component segments, a percentage rating is used if only some of the components satisfy the requirements. For example, Alternative 3 is graded 67 percent since only two of the three components (I-580 westbound HOV lane and the interchange improvements) have a PSR.

Funding identified for the project would be based on the financially constraint element of the RTP, STIP, or countywide plan. The financial element is dynamic because funds can be shifted between projects and the state infrastructure bond may add additional funding. After the estimated construction cost for each alternative package is finalized, the CMA will work with the Team to estimate the amount of funding available for each alternative. An important part of the process will be to update the RTP to clarify how much funding was agreed upon for each project. (Note: the RTP will be updated starting in 2007 with adoption in February 2009.) For each alternative, depending on the segments that have funding and the cost of these segments, a prorated point system would be used to denote how much of the alternative is actually funded.

The rating for this qualitative measure would have a maximum of 10 points. The rating for each of the four factors could have a maximum of 2.5 points. A "yes" answer would receive 2.5 points, while a "no" would receive 0 points. Funding would be prorated, with 100 percent funding identified receiving 2.5 points, 50 percent identified funding receiving 1.25 points, and so on.

Compatibility with other Planned Improvements

This section shows the compatibility of the alternatives with other planned improvements by considering two linked questions.

- The first question asks whether the project would function well by itself. If so, the answer is "yes."
 If the project needs other necessary improvements to function well it, the answer would be "no."
- If the above factor is answered "no," that is, if the alternative requires additional improvements to function well, the second question asks whether these necessary improvements would likely be constructed within the project time frame. If the first factor is answered "yes," the second question will not apply to the particular alternative.

PARSONS Page 3

Triangle PAC June 1, 2006

The rating for this qualitative measure would have a maximum of 10 points: a "yes" on the first question would receive 10 points (the second question is not applicable in this case). A "no" on the first question and a "yes" on the second question would receive 5 points. "No" on both questions would receive 0 points.

Connectivity and Access

This section evaluates the improvement in connectivity and regional access provided by the alternatives. The first factor, as shown in Table 1, is used to evaluate the alternatives based on whether the Alternative closes gaps in HOV lane connectivity in the corridor. For this reason, Alternatives 3 and 6 which close I-680 HOV lane gaps in the corridor are rated 'yes'.

The second factor addresses the question of whether the alternatives would improve access on regional facilities through Tri-Valley area. This factor evaluates whether the alternatives would improve conditions for through trips in the corridor, with improved access for through trips on regional facilities meaning less 'cut-through' traffic using local streets. Alternatives providing improved access and connectivity receive a "yes" and others "no." Again, the scoring will be a total of 5 points for the qualitative measure and a rating of 0 or 2.5 for each component factors, based on a subjective evaluation of the factors.



| Table 1: Qualitative | e Data S | heet fo | r Alte | rnativ | es | | | |
|--|-------------------|----------|---------|---------|-------------|---------|----------|----------|
| | | | | | Alternative | es | | |
| Qualitative Measures - Factors to be Considered in Scoring | Maximum Points | 1 | 2A | 2B | 3 | 4 | 5 | 6 |
| Location of bottlenecks and queues (a) | 5 Total | | | | | | | |
| Does the overall number of bottlenecks and length of queues | | | | | | | | |
| increase, stay the same, or decrease? | 1 | Decrease | Neutral | Neutral | Decrease | Neutral | Decrease | Decrease |
| Is the effect positive within the Alameda County jurisdiction? | 1 | YES | Neutral | Neutral | YES | Neutral | YES | Neutral |
| Is the effect positive within the City of Dublin jurisdiction? | 1 | NO | YES | YES | YES | Neutral | NO | Neutral |
| Is the effect positive within the City of Livermore jurisdiction? | 1 | YES | YES | YES | YES | YES | YES | YES |
| Is the effect positive within the City of Pleasanton jurisdiction? | 1 | YES | NO | NO | NO | Neutral | YES | YES |
| Project readiness | 10 Total | | | | | | | |
| Have environmental studies begun? | 2.5 | NO | NO | NO | NO | NO | NO | NO |
| Is the project free from potential obstacles that could impede its | | | | | | | | |
| delivery? | 2.5 | (b) | (b) | (b) | (b) | (b) | (b) | (b) |
| Is there a PSR supporting the project? | 2.5 | Yes (c) | YES (d) | YES (d) | 67% (d,e) | Yes (f) | YES (c) | NO |
| Funding - Is it in the financially constrained part of the RTP or in | | | | | | | | |
| the countywide plan? | 2.5 | TBD (g) | TBD (g) | TBD (g) | TBD (g) | TBD (g) | TBD (g) | TBD (g) |
| Compatibility with other planned improvements | 10 Total | | | | | | | |
| Does the project function well without requiring other necessary | | | | | | | | |
| improvements? | 5 | YES (h) | NO (i) | NO (i) | YES | YES | YES (h) | YES |
| Are the other necessary improvements likely to be constructed | | | | | | | | |
| within project time frame? | 5 | N/A | NO | NO | N/A | N/A | N/A | N/A |
| Connectivity and access | 5 Total | 147.1 | 1,0 | -,, | 13// 1 | 14// 3 | 13// 3 | 14// (|
| Does the project close HOV Lane gaps in the transportation | o i otal | | | | | | | |
| system? | 2.5 | NO | NO | NO | YES | NO | NO | YES |
| • | | | | | | | | |
| Does the project improve access on regional facilities through | | | | | | | | |
| the Tri-Valley area for through trips? | 2.5 | YES | YES | YES | YES | YES | YES | YES |

Description of Alternatives:

- 1 WB 580 HOV, Greenville to Isabel; widen Rte 84 from I-680 to Pigeon Pass and modify I-680/Route 84 Interchange
- 2A WB 580 HOV, Greenville to direct connector and WB 580 to SB 680 HOV and mixed flow two-lane direct connector (connecting to existing I-680) on right side. The WB 580 to SB 680 loop ramp stays.
- 2B WB 580 HOV, Greenville to direct connector and WB 580 to SB 680 HOV and mixed flow two-lane direct connector (connecting to existing I-680) in the median. The WB 580 to SB 680 loop ramp stays.
- 3 WB 580 HOV, Greenville to direct connector; WB 580 to SB 680 HOV and mixed-flow two-lane direct connector in the median, and SB 680 HOV, from Alcosta to Rte 84. The WB 580 to SB 680 loop ramp stays.
- 4 Truck Climbing lane, from Truck scale to North Flynn Road.
- Widen Rite 84 from I-680 to Pigeon Pass and modify I-680/Route 84 Interchange. Add mixed flow lane from Isabel to Vasco road plus WB HOV lane from Greenville to Isabel.
- NB 680 HOV lane, Alameda Creek to Alcosta Interchange; NB 680 to EB HOV direct connector in the median; HOV lane form direct connector to the eastbound I-580 HOV lane (Year 2030 Base Case); and mixed flow lane from east of Tassajara Rd/Santa Rita Blvd to Vasco Road.

Notes:

- a) "YES" means that queues are better (+1 score); "NO" means that they are worse (-1 score). "Neutral" means that they are roughly the same (0 score).
- b) This item is left open for input from the PAC.
- c) A PSR/PDS was approved by Caltrans that includes widening of Vallecitos Road
- d) A PSR is in progress by the CMA
- e) 67% means two thirds of the improvements are covered in a PSR
- f) SJCOG is preparing a PSR for the eastbound truck climbing lane.
- g) Amount of funding available will be determined after costs and state bond descriptions are finalized. Currently, all the alternative packages have some funding identified, so the rating for this item will be on what percentage of the needed funding is currently identified. There is no funding for Route 84 from I-680 to Pigeon Pass.
- h) Modification at the I-680/Route 84 interchange includes widening on southbound I-680; current costs include widening only to Alameda Creek, but extension to the southbound truck climbing lane may be required for I-680 satisfactory operations, depending on the ramp metering rate.
- i) Requires closure of HOV Lane system gaps on I-680

TRIANGLE TRAFFIC STUDY PAC Meeting Packet June 9, 2006

Agenda Item 6 – Schedule

<u>Tri-Valley "Triangle" Traffic Study</u> Critical Schedule Milestones and Critical Decision Points

| Major PAC Milestones | Critical TAC Decisions and Actions | PAC Meetings and Actions | Schedule Constraints and Notes | | | | |
|---|---|---|---|--|--|--|--|
| Approve Scope of Work | Completed | Completed | | | | | |
| Approve Selection of Traffic Forecast Model | Completed - Changed Scope to use CCTA Tri-Valley Travel Forecast Model | Approved Changes in Scope | Scope Change, Additional traffic analysis, and final decision on the use of models have delaye schedule | | | | |
| Approve Selection of Traffic Operations Model | Completed | Completed | Decision on selection of traffic model have delayed schedule | | | | |
| Approve Alternatives to be Tested | Completed | Completed | Completed as scheduled | | | | |
| Approve Quantitative Measure Evaluation Methodology and Qualitative Measure Factors | Completed | Completed | Additional traffic analysis and fine tuning of the traffic models have delayed schedule | | | | |
| Approve Traffic Analysis Results for Base Case and Alternatives | Completed | June 9, 2006 PAC Meeting. PAC to approve TAC's recommendations | Late decision delays schedule | | | | |
| Develop and Test Hybrid Alternative | TAC and PAC to meet in workshop setting on June 30, 2006 to develop a hybrid concept for testing. | TAC and PAC to meet in workshop setting on June 30, 2006 to develop a hybrid concept for testing. | Late decision delays schedule | | | | |
| Report Hybrid Alternative Results | Report Hybrid analysis results to TAC for review and input in early August 2006. | Mid-August 2006 PAC Meeting; PAC to approve TAC's recommendations on Hybrid Alternative results. | Late decision or change delays schedule | | | | |
| Approve Recommendations in Draft Report including Phasing and Implementation Strategy Recommendations | Requires TAC's review and comment in early to mid-September 2006 | October 2006 PAC Meeting. PAC to approve TAC's recommendations | Late decision delays schedule | | | | |
| Final Report | TBD if TAC's needs to review before finalizing | TBD if PAC's needs to review before finalizing | Final - Late October 2006 | | | | |